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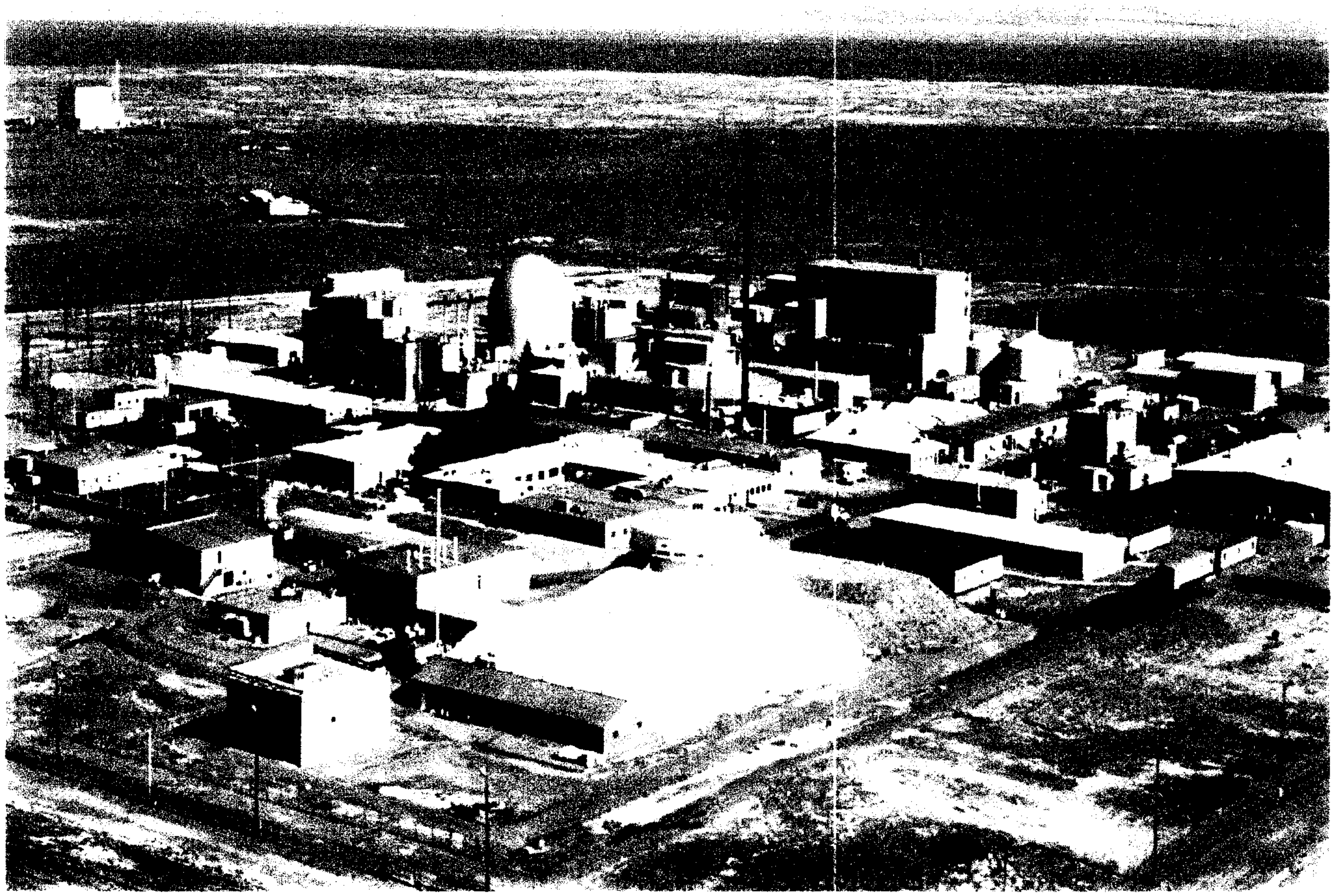
Final Remedial Design

Argonne National Laboratory - West



Operable Unit 9-04
Idaho National Engineering and Environmental Laboratory
Idaho Falls, Idaho

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Final Remedial Design
Argonne National Laboratory - West

August, 2004

Prepared by:

The Department of Energy
The Idaho Department of Environmental Quality
and
the Environmental Protection Agency-Region 10

Operable Unit 9-04
Idaho National Engineering and Environmental Laboratory
Idaho Falls, Idaho

Abstract

This comprehensive remedial design/remedial action work plan for Waste Area Group 9, Operable Unit 9-04, was developed to implement the contingent alternative (Excavation and Disposal) as stated in the *Final Record of Decision for the Argonne National Laboratory-West*. A formal Explanation of Significance Document has been written and submitted that formally changes the selected remedy to the contingent remedy. During the comprehensive remedial investigation/feasibility study, it was determined that eight sites contain unacceptable risks to human or ecological receptors if no remedial action is implemented. To date four sites have successfully met the remediaiton goals and these are; Ditch B, Main Cooling Tower Blowdown Ditch, Interceptor Canal-Canal, and the Interceptor Canal-Mound. Three sites will undergo remediation in accordance with this Remedial Design Work Plan and include the Industrial Waste Pond, and portions of Ditch A and the Industrial Waste Lift Station Discharge Ditch. The last site requiring remediation is the Sanitary Sewage Lagoon which will be delayed until approximately 2035. This Remedial Design report describes (in detail) the specifications for implementing the remedial action at these eight sites.

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Table of Contents

APPENDICES

Figures

Tables

ACRONYMS

ANL-W	Argonne National Laboratory - West
ARARs	Applicable or Relevant and Appropriate Requirements
BBWI	Bectel, Babcox and Wilcox, Incorporated
BLS	Below Land Surface
BTU	British Thermal Unit
CFA	Central Facilities Area
CFR	Code of Federal Regulations
COC	Contaminant of Concern
COCA	Consent Order and Compliance Agreement
COPC	Contaminant of Potential Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DEQ	Department of Environmental Quality
DOE	Department of Energy
DOE-ARG	Department of Energy-Argonne Group
DOE-CH	Department of Energy-Chicago Operations Office
DOE-ID	Department of Energy-Idaho Operations Office
EPA	Environmental Protection Agency - Region 10
ERA	Ecological Risk Assessment
EBR-II	Experimental Breeder Reactor II
FS	Feasibility Study
FFA/CO	Federal Facility Agreement and Consent Order
FCF	Fuel Conditioning Facility

HASP	Health and Safety Plan
Hqs	Hazard Quotients
HFEF/S	Hot Fuel Examination Facility South
HWMA	Hazardous Waste Management Act
ICDF	Idaho CERCLA Disposal Facility
ICP	Institutional Control Plan
IDAPA	Idaho Administrative Procedures Act
IFR	Integral Fast Reactor
INEEL	Idaho National Engineering and Environmental Laboratory
LMITCO	Lockheed Martin Idaho Technologies Company
MSL	Mean Sea Level
NOAA	National Oceanic and Atmospheric Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Act
OU	Operable Unit
PCBs	Polycholorinated Biphenyls
PPE	Personnel Protection Agency
RAOs	Remedial action Objectives
RGs	Remediation Goals
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RI	Remedial Investigation

RCRA	Resource Conservation and Recovery Act
RWMC	Radioactive Waste Management Complex
SRP	Snake River Plain
SRPA	Snake River Plain Aquifer
SPF	Sodium Process Facility
TBC	To Be Considered
TREAT	Transient Reactor Test Facility
UCL	Upper Confidence Limit
UMTRA	Uranium Mill Tailings Remedial Action
USDA	United States Department of Agriculture
WAG 9	Waste Area Group 9
WERF	Waste Experimental Reduction Facility
ZPPR	Zero Power Physics Reactor

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Waste Area Group 9
Draft Remedial Design

1 INTRODUCTION

1.1 INEEL Background

The Idaho National Engineering and Environmental Laboratory (INEEL) is a government facility managed by the U.S. Department of Energy (DOE), located 32 miles (51 km) west of Idaho Falls, Idaho, and occupies 890 square miles (2,305 km^2) of the northeastern portion of the Eastern Snake River Plain. Argonne National Laboratory-West (ANL-W) is located in the southeastern portion of the INEEL, as shown in Figure 1-1. To better manage environmental investigations, the INEEL was subdivided into 10 Waste Area Groups (WAGs). Identified contaminant release sites in each WAG were in turn divided into operable units (OUs) to expedite the investigations and any required remedial actions. Waste Area Group 9 covers ANL-W and contains four OUs that were investigated for contaminant releases to the environment. Within these four OUs, 37 known or suspected contaminant release sites have been identified. Two of the identified 37 release sites have been further subdivided into smaller areas based on their waste discharges and physical modeling parameter variations within a release site. Thus, the term "site" will herein refer to a named release site in one of the OUs. While "area" will herein be used to define all or a portion of an identified OU release site. In addition to the 37 release sites, ANL-W has also investigated two sites from WAG 10 that are within a mile of the facility and may have co-located risks.

The INEEL lands are within the aboriginal land area of the Shoshone-Bannock Tribes. The Tribes have used the land and waters within and surrounding the INEEL for fishing, hunting, plant gathering, medicinal, religious, ceremonial, and other cultural uses since time immemorial. These lands and waters provided the Tribes their home and sustained their way of life. The record of the Tribes' aboriginal presence at the INEEL is considerable, and DOE has documented an excess of 1,500 prehistoric and historic archeological sites at the INEEL.

Facilities at the INEEL are primarily dedicated to nuclear research, development, and waste management. Surrounding areas are managed by the Bureau of Land Management for multipurpose use. The developed area within the INEEL is surrounded by a 500-square-mile (1,295 km^2) buffer zone used for cattle and sheep grazing. Communities nearest to ANL-W are Atomic City (southwest), Arco (west), Butte City (west), Howe (northwest), Mud Lake (northeast), and Terreton (northeast). The land surrounding the INEEL is approximately 45% agricultural, 45% open, and 10% urban. Sheep, cattle, hogs, poultry, and dairy cattle are produced; and potatoes, alfalfa, sugar beets, wheat, barley, oats, canola, sunflower, forage, and seed crops are cultivated. Most of the land surrounding the INEEL is owned by private individuals or the U.S. Government, as shown in Figure 1-2.

Public access to the INEEL is strictly controlled by fences and security personnel. State Highways 22, 28, and 33 cross the northeastern portion of the INEEL and U.S. Highways 20 and 26 cross the southern portion approximately 20 miles (32.2 km) and 5 miles (8 km) away from ANL-W, respectively. A total of 90 miles (145 km) of paved highways pass through the INEEL and are used by the general public.

The Snake River Plain Aquifer (SRPA), the largest potable aquifer in Idaho, underlies the Eastern Snake River Plain and INEEL. The aquifer is approximately 200 miles (322 km) long, 20 to 60 miles (32.2 to 96.5 km) wide, and covers an area of approximately 9,600 square miles (24,853 km^2). The depth to the SRPA varies from approximately 200 feet (61 m) in the northeastern corner of the INEEL to approximately 900 feet (274 m) in the southeastern corner. This change in groundwater depth in the northeastern corner to the southeastern corner occurs over a horizontal distance of 42 miles (67.6 km). Depth to groundwater is approximately 640 feet (195 m) below ANL-W and the groundwater flow direction is south-southwest. Drinking water for employees at ANL-W is obtained from two production wells located in the west-central portion of the ANL-W facility.

Most INEEL facilities are currently operated by one of three Government contractors: a consortium of Bechtel, Babcox and Wilcox Incorporated (BBWI), Bechtel Naval Reactors, and Argonne National Laboratory-West (ANL-W). All conduct various programs at the INEEL under the supervision of three DOE offices: DOE-Idaho (DOE-ID), Department of Defense-Pittsburgh Naval Reactors Office, and DOE-Chicago (DOE-CH), repsectively.

1.2 ANL-W Background

ANL-W, a prime operating contractor to DOE-CH, began a redirected nuclear research and development program in FY 1995. The redirected program involves research to help solve near-term high-priority missions, including the treatment of DOE spent nuclear fuel and reactor decontamination and decommissioning technologies. ANL-W has completed the process of radiologically safe shutdown and termination activities for the Experimental Breeder Reactor II (EBR-II). Within the ANL-W site are a number of research and support facilities that contribute to the total volume of waste generated at ANL-W. These facilities currently generate radioactive low-level waste, radioactive transuranic waste, hazardous waste, mixed waste, sanitary waste, and industrial waste. Approximately 600 people are currently employed at the ANL-W facility.

ANL-W was established in the mid 1950s and is located approximately 30 miles west of Idaho Falls. ANL-W houses extensive support facilities for three major nuclear reactors: the Transient Reactor Test Facility (TREAT), EBR-II, and the Zero Power Physics Reactor (ZPPR).

The first reactor to operate at the ANL-W site was TREAT, which was built in 1959. As its name implies, TREAT was designed for overpower transient tests of fuel. Its driver fuel, consisting of finely divided uranium oxide in a graphite matrix, has a high heat capacity that enables it to withstand tests in which experimental fuel may be melted. Used extensively at first for safety tests of water-reactor fuels, TREAT is now used mainly for safety tests for various fuel types as well as for nonreactor experiments. It has periodically undergone modifications as part of the TREAT upgrade project.

EBR-II, a 62.5 megawatt thermal reactor, went into operation in 1964 capable of producing 19.5-megawatts of electrical power in the liquid-metal reactor power plant. It is a pool-type sodium-cooled reactor, designed to operate with metallic fuel. It was provided with its own Fuel Cycle Facility (FCF), adjacent to the reactor building, for remote pyrometallurgical reprocessing and refabrification of reactor fuel. The Fuel Cycle Facility provided five complete core loadings of recycled fuel for EBR-II.

Over the years, the mission of EBR-II was redirected from that of a power-plant demonstration (with integral fuel cycle) to that of an irradiation test facility for mixed uranium-plutonium

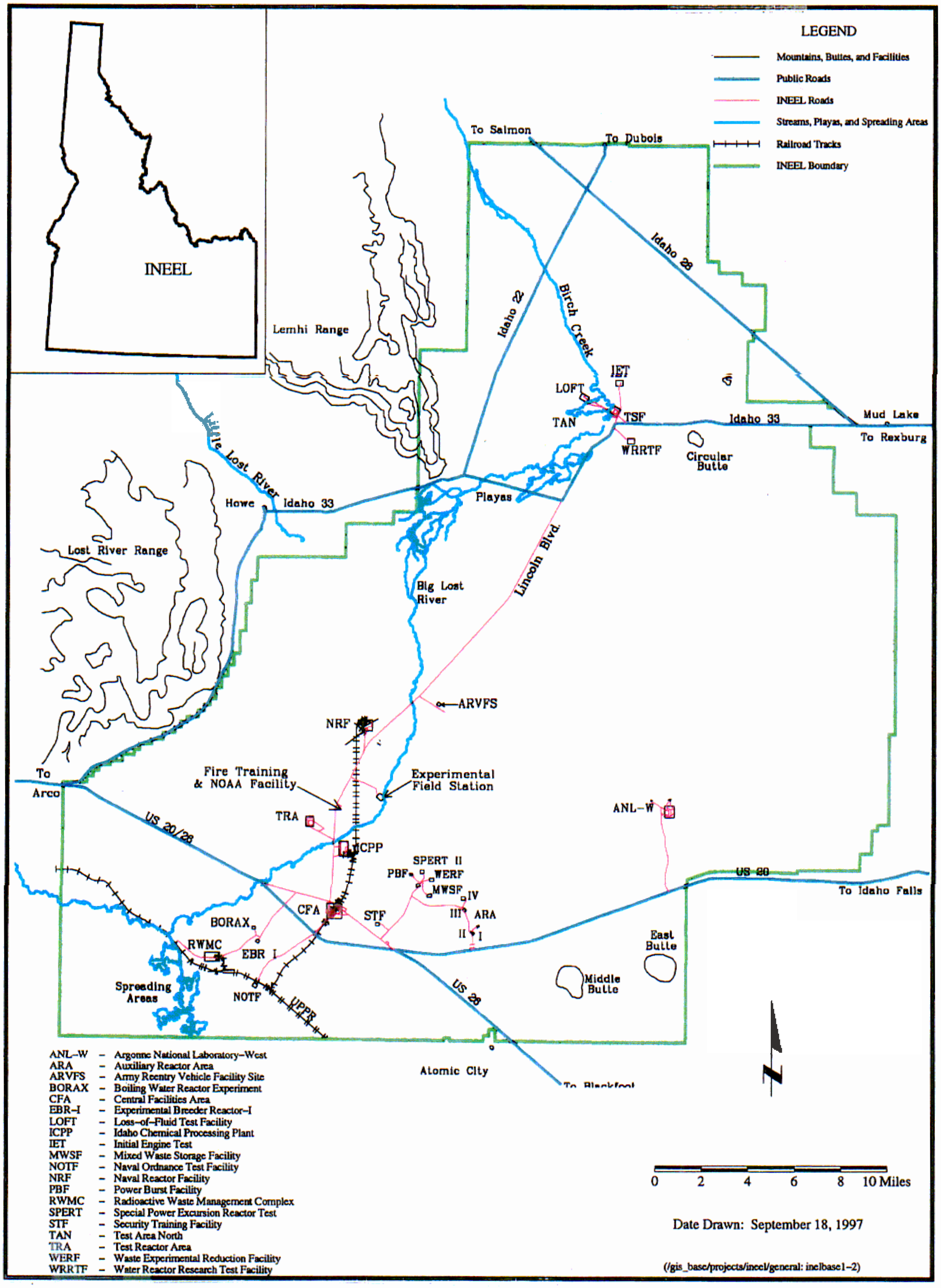


Figure 1-1. Location of the INEEL and Major Facilities with Respect to the State of Idaho.

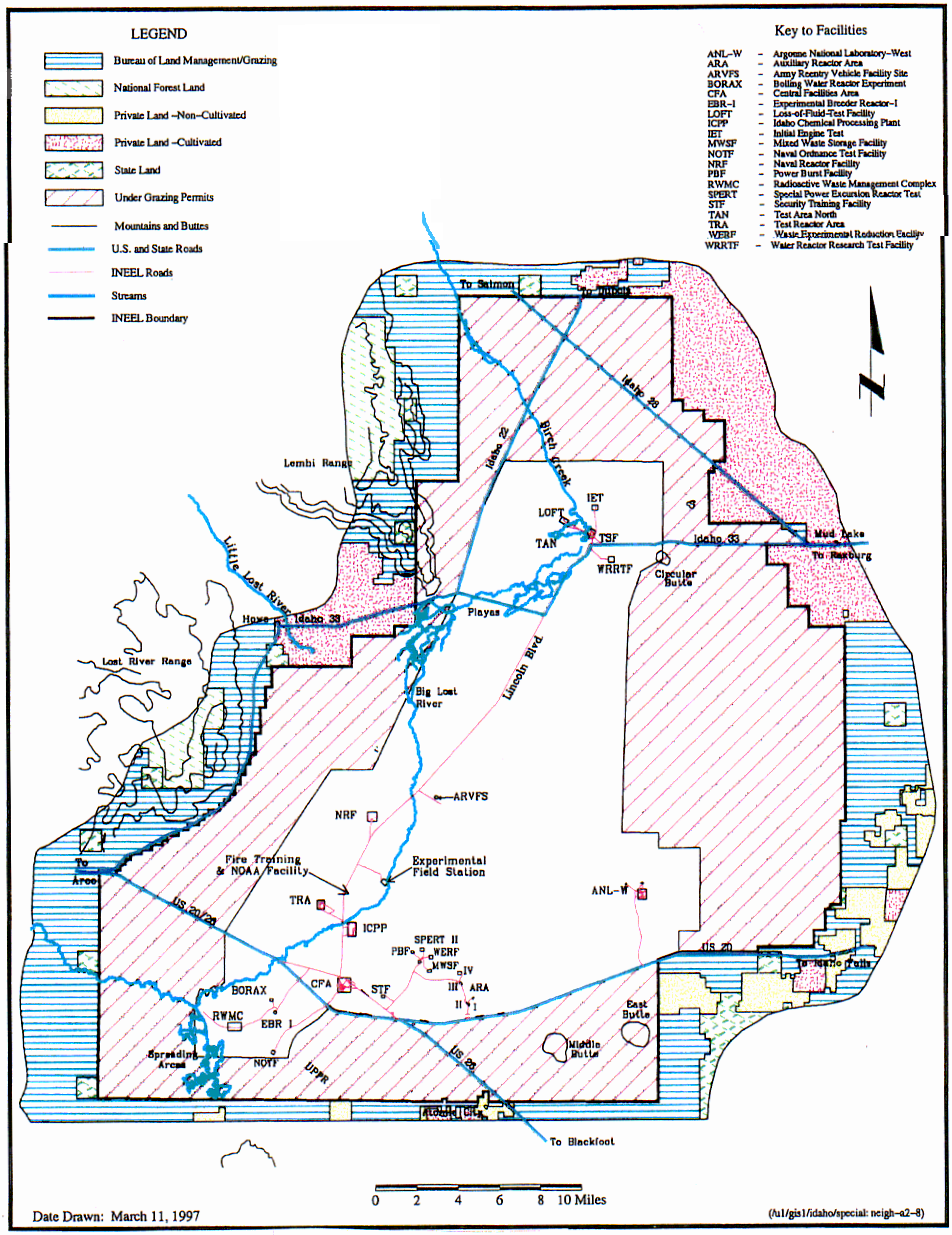


Figure 1-2. Ownership of Lands Surrounding the INEEL.

fuels for future liquid-metal reactors. The pyrometallurgical process used in the Fuel Cycle Facility was not suitable for ceramic fuels so the facility was converted to the Hot Fuel Examination Facility South (HFEF/S).

EBR-II continued to be fueled with metallic uranium driver fuel for operating convenience. This fuel was gradually improved to greatly increase its burnup, thus contributing to a high plant factor for irradiation tests. Over the years of operation, much valuable operating experience has been gained on sodium systems, including the removal and maintenance of primary sodium pumps and other components. In the 1970s, the mission of EBR-II was again shifted in emphasis; this time to the Operational Reliability Testing Program. This program was aimed at studying the milder, but more probable types of fuel and reactor malfunctions that could lead to accident sequence. In addition to preventing accidents, its aim was to better define the operating limits and tolerable faults in reactor operation, thus leading to both safer and more economical plants. The components of this EBR-II program included tests of fuel to and beyond cladding breach, loss-of-coolant flow tests, mild power transients, and studies of man-machine interfaces.

In the early 1980s, ANL-W reexamined the basic design of liquid-metal-cooled fast reactors. The results of this study led to the Integral-Fast-Reactor (IFR) concept. The IFR incorporated four basic elements: sodium cooling; a pool configuration; a compact, integral fuel cycle facility; and a ternary metal alloy fuel. Modifications to EBR-II and HFEF/S have been made to support the pyroprocessing and fuel manufacturing for the IFR demonstration project. Since 1994, ANL-W has been conducting shutdown and termination activities for the EBR-II. These shutdown activities include defueling EBR-II and draining the primary and secondary sodium loops and placing the reactor in a radiologically safe shutdown condition. The Fuel Cycle Facility has been converted to the Fuel Conditioning Facility. The mission of the Fuel Conditioning Facility is to electrochemically treat EBR-II fuel to create radioactive waste forms that are acceptable for disposal in a national geologic repository.

ZPPR was put into operation at ANL-W in 1969. ZPPR is large enough to enable core-physics studies of full-scale breeder reactors that will produce up to 1,000 megawatts. ZPPR has also been used for mockups of metallic cores and space-reactor cores. ZPPR was placed in programmatic standby in fiscal year 1989 and remains in that condition.

Various chemical and radioactive wastes were generated from these three reactors and the support facilities at ANL-W. Operation of these facilities and the corresponding waste streams have been evaluated and documented in the Facility Assessment and Screening document of 1973. This document, which is based on process knowledge, has been used as an initial starting point for ANL-W cleanup activities.

1.3 Identification of Release Sites

Potential release sites identified at ANL-W facilities in the Federal Facility Agreement and Consent Order (FFA/CO) include wastewater structures and leaching ponds, underground storage tanks, rubble piles, cooling towers, an injection well, french drains, and assorted spills. Possible contaminants at the various ANL-W sites include primarily petroleum products, acids, bases, PCBs, radionuclides, and heavy metals. These are the chemical and radioactive wastes generated from scientific and engineering research at ANL-W.

1.4 Enforcement Activities

In July 1989, the Environmental Protection Agency proposed listing the INEEL on the National Priorities List (NPL) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The Environmental Protection Agency (EPA) issued a final ruling that listed the INEEL as an NPL site in November 1989. The FFA/CO was developed to establish the procedural framework and schedule for developing, prioritizing, implementing, and monitoring response actions at the INEEL in accordance with CERCLA, the Resource Conservation and Recovery Act (RCRA), and Idaho Hazardous Waste Management Act. DOE, the EPA and State of Idaho Department of Environmental Quality (DEQ) have determined that hazardous waste release sites at ANL-W would be remediated through the CERCLA process, as defined in the FFA/CO, which superseded the existing RCRA-driven Consent Order and Compliance Agreement (COCA) requirements. The FFA/CO identified 4 OUs, consisting of 19 sites within Waste Area Group 9 that required additional activities under the CERCLA process. An additional 18 sites were determined to need no further action at the time the FFA/CO was signed. Thus, a total of 37 WAG 9 sites were evaluated during the OU 9-04 Comprehensive RI/FS process and the results are summarized in this ROD.

One unit in OU 9-04 [Main Cooling Tower Blowdown Ditch (ANL-01A)] was originally included as a Land Disposal Unit under COCA on the basis that corrosive liquid wastes were discharged after 1980. In August 2000, ANL-W received written notification from the Hazardous Waste Program Manager for the State of Idaho that stated that the soil pH does not present a human or ecological risk or exhibit the characteristics of a RCRA hazardous waste. Therefore, the substantive requirements of IDAPA 58.01.05.008 [40 CFR 264, Subpart G] have been accomplished pursuant to Section 5.7.2.5 of the ROD and in accordance with Section 6 of the Final Remedial Design.

The OU 9-04 comprehensive RI/FS conducted ANL-W resulted in the identification of eight areas with potential risk to human health and/or the environment that would require some type of remedial action (W7500-000-ES-02, October 1997). The Proposed Plan (January 1998) identified the agencies' preferred alternative for the eight areas of concern at ANL-W.

1.5 ROD Summary

The Record of Decision (ROD) for WAG 9 was signed on September 29, 1998, and identifies that eight areas will undergo remediation until the Remediation Goals (RGs) are met. To meet the RGs, DOE has identified a selected remedy of phytoremediation and a contingent remedy of excavation and disposal. DOE has prepared an Explaination of Significant Difference (ESD) and published the information in newspapers in Idaho, prior to the implementation of the contingent remedy. A brief summary of each remedy is included in Sections 1.5.1 and 1.5.2, respectively.

Investigation of the 37 WAG 9 sites at ANL-W and the 2 WAG 10 sites near ANL-W resulted in identification of eight areas that would require some sort of action to be protective of human health and the environment. Of these eight areas, the ANL-09 Interceptor Canal-Canal contained cesium-137 that will naturally decay to acceptable levels within the next 100-years under Institutional Controls. This site only requires controls to make sure that the DOE 100 year institutional controls are still in place and are protective. Thus, only seven areas are retained for remedial activities.

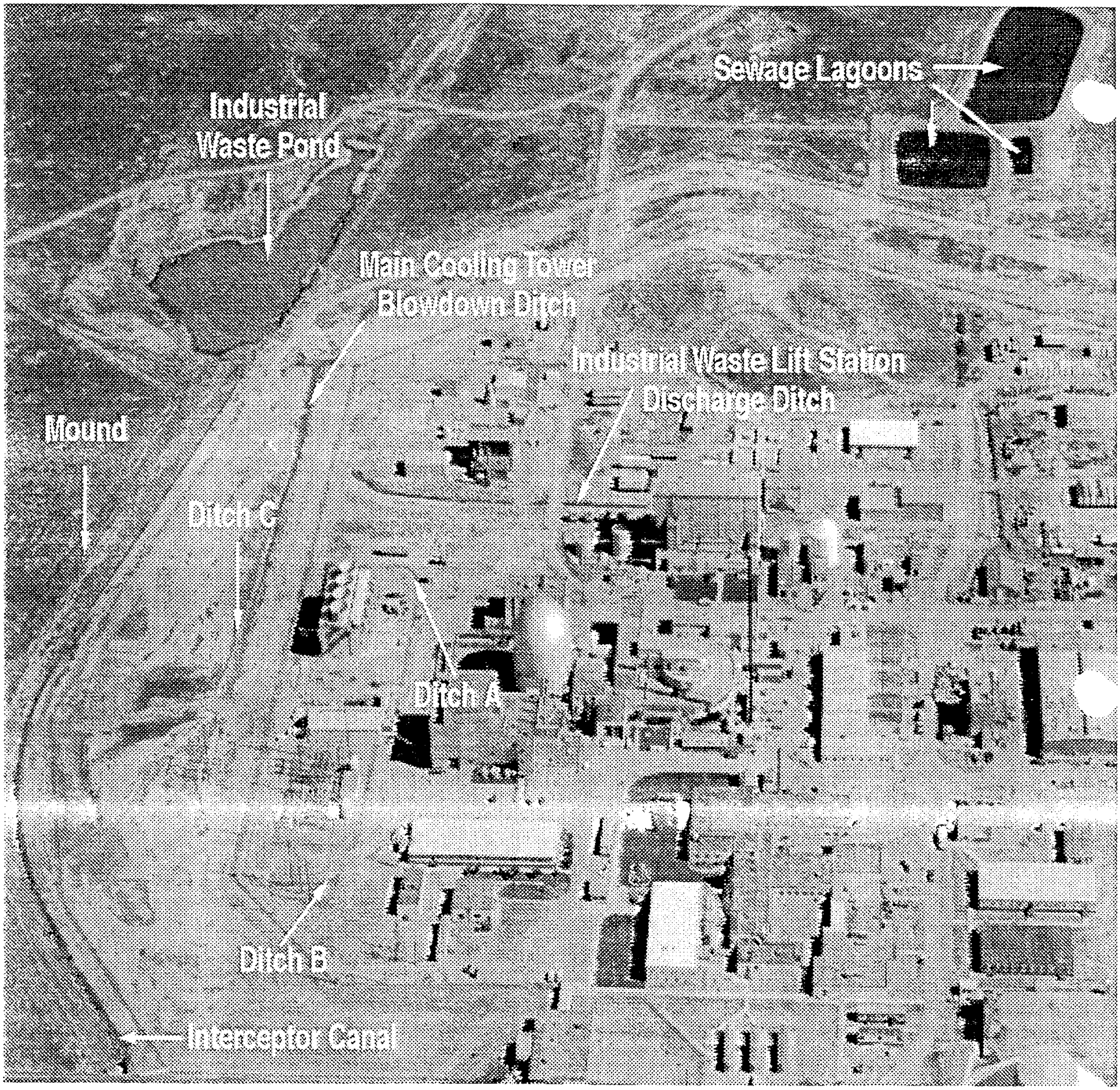
The seven areas that are targeted to undergo remedial activities in accordance with the WAG 9 ROD signed on September 29, 1998, are shown in Figure 1-3. One of these seven sites, Sanitary Sewage Lagoons (ANL-04) will not undergo remedial activities in approximately 2033 when its useful life is complete. The Sanitary Sewage Lagoons contain contaminants in the sludges that pose unacceptable risks to the small burrowing ecological receptors. The delay in remedial activities does not pose any unacceptable risks since these areas will continue to accept discharge water and the sludges are underwater, which eliminates the exposure pathway to the burrowing animals. Remedial activities will be initiated when their useful life is complete and if the new sample results exceed latest soil screening levels for human and ecological receptors for the viable exposure pathways. Continued releases over time may change the concentrations of the known contaminants in these areas and/or soil screening levels will change over time with new risk assessment data being evaluated and incorporated.

1.5.1 Description and use of Selected Remedy

The selected remedy for these sites; Industrial Waste Pond and associated Ditches (ANL-01), Main Cooling Tower Blowdown Ditch (ANL-01A), Sanitary Sewage Lagoons (ANL-04), Interceptor Canal (ANL-09), and the Industrial Waste Lift Station Discharge Ditch (ANL-35) — was phytoremediation. Phytoremediation is the generic term for "phytoextraction" an innovative/emerging technology that utilizes plants to extract the contaminants from the soil. Phytoremediation was conducted insitu to remove the metals and the radionuclides from the soils via normal uptake mechanisms of the plants. The plant vegetation was then harvested, sampled, and shipped to an appropriate disposal facility based on analytical results.

The effectiveness and technical implementability of phytoremediation are very site-specific. DOE estimated that for cost effectiveness seven growing seasons would be the break even point between phytoremediaiton and excavation and disposal contingent remedy. In 1998, DOE conducted a bench-scale testing of ANL-W soils and determined that two areas Ditch B and the east portion of the Main Cooling Tower Blowdown Ditch had levels of contaminants that exceeded those of practicle limits of phytoremediation. These two sites used the contingent remedy of excavation and disposal for cleanup in 1999.

In 1999 ANL-W began the phytoremediation field-scale testing on four waste sites. These sites were the Main Cooling Tower Blowdown Ditch (West portion), Industrial Waste lift Station Discharge Ditch, Ditch A, and the Interceptor Canal-Canal. The contaminants of concern for these sites were inorganic contaminants that posed unacceptable risks and cesium-137 that posed human health risks. Because phytoremediation was a new technology DOE implemented a two-year go-no-go to determine if phytoremediation should continue. Results after the first two-years indicated that the contaminants in each of the sites showed significant reductions from the initial concentrations. If these reductions were to continue, the soils in the sites should meet the remediation goals within the next two years. Soil samples collected after four years of phytoremediation indicated that two sites Ditch A and the Industrial Waste Lift Station Discharge Ditch which had inorganic contaminants of mercury and silver, respectively had concentrations of contaminants that remained above the RGs. It was also apparent that these two inorganic contaminants showed very little removals and similar concentrations to those results in 2000. This resistance to phytoremediation was not surprising since mercury and silver are not nutrients typically found in plants. The other two sites Interceptor Canal-Canal and the Main Cooling Tower Blowdown Ditch did meet the RGs because concentrations of contaminants were lower (mercuery and chromium) and the contaminants were replacemnets for essential plant nutrients (cesium-potasium). Thus, it was determined



that continued use of phytoremediation at Ditch A and the Industrial Waste Lift Station Discharge Ditch would not be practical and the contingent remedy should be implemented.

Figure 1-3. Location of the Argonne National Laboratory-West Sites that Require Remediation.

1.5.2 Description of Contingent Remedy

Since the selected remedy of phytoremediation did not adequately reduce the principle risks to human health and the environment in Ditch A, Industrial Waste Lift Station Discharge Ditch the contingent remedy of excavation and disposal will be implemented to complete the remediation. Based on the ineffectiveness of phytoremediation on similar contaminants and concentraitons, the use of contingent remedy of excavation and disposal will also be utilized on the Industrial Waste Pond. The on-INEEL disposal location for these contaminated soils will be determined based on the radioactivity of the soils. If the soils contain radioactivity, the soils will be shipped to the INEEL CERCLA Disposal Facility (ICDF). If the soils do not contain radioactivity, the soils can be placed at the Central Facilities Area (CFA) Bulky Waste Landfill. For the three sites that will utilize the contingent remedy, the soils from Ditch A and the Industrial Waste Lift Station Discharge Ditch will be placed in the CFA Bulky Waste Landfill and the soils from the Industrial Waste Pond will be placed in the ICDF. The major components of the contingent remedy for ANL-W are:

- Contaminants in the waste areas are currently planed for excavation and disposal (on-INEEL) will be based on the radiation levels in the soil. Final location of soils will be documented in the ESD.
- Confirmation sampling would be used to validate that the remaining soil concentrations are below the RAOs.
- Review of the remedy no less than every five years from the ROD signature until the year 2098.
- Implementation of DOE controls that limit residential land use for at least 100 years from now (2098).

The no action alternative is reaffirmed and selected as the appropriate alternative for the remaining 33 areas at ANL-W. These 33 areas have risks that are at acceptable levels based on the information gathered during the remedial investigation.

The possibility exists that contaminated environmental media (not identified by the INEEL FFA/CO or in this comprehensive investigation) will be discovered in the future as a result of routine operations, maintenance activities, and decontamination and dismantlement activities at ANL-W. Upon discovery of a new contaminant source by DOE, State of Idaho DEQ, or the EPA, that contaminant source will be evaluated and appropriate response action taken in accordance with the FFA/CO.

1.6 Scope of Draft Remedial Design

This draft Remedial Design Work Plan summarizes the information necessary to perform the Excavation and Disposal of the Industrial Waste Pond and portions of Ditch A and the Industrial Waste Lift Station Discharge Ditch as specified in the WAG 9 ESD. Best efforts will be made during excavation of these sites to ensure minimal amount of soil is removed and yet ensure that RGs will be met. This will be completed using real time instrumentation in the field to determine the radionuclide and inorganic concentrations during the excavation. The draft RD will be written in enough detail that the EPA and State of Idaho DEQ WAG managers, DOE officials, and ANL-W employees and subcontractors can use it as a recipe for the work to be conducted at ANL-W. The majority of the excavation and disposal activities will be performed by subcontractors to the INEEL Subcontractor BBWI. Once this RD document is final any changes that are necessary to perform the excavation and disposal activities will be made by updating and revising the standard operating procedures. This will allow ANL-W the flexibility to tailor various activities to the actual site conditions as they change without revising and resubmitting the RD to the WAG managers. The objectives of this RD are to:

- Determine the extents of contamination in each of the sites undergoing remediation. This will be accomplished by using analytical results of the soils as well as real time information conducted before and during excavation.

- Perform soil-confirmation sampling after the excavation activities have been completed. Additional excavation and disposal may be necessary after definitive analytical analysis of soils collected from confirmation sampling. This process is an iterative process of soil removal and confirmation sampling. No confirmation samples will be collected of basalt or interbeds below the basalt if all soils in the site is removed to basalt (i.e., no soils above basalt- no viable source of contamination).

- Develop equipment and procedures necessary to safely package and transport plant matter to other DOE facilities for disposal.

1.7 Report Organization

This RD Report has been written to serve two purposes. The first purpose is to fulfill a regulatory deliverable to the EPA and IDEQ WAG managers as part of the FFA/CO agreement. The second is to provide all the necessary information that a contractor would need in order to complete the remedial activities. Thus, this document has been written in a "cookbook" fashion (that is to say it is a recipe for completing the excavation and disposal activities at ANL-W while still fulfilling the FFA/CO requirements).

Section 1 provides a brief history of what has happened to date in the cleanup of the WAG 9 site, and a brief description of the organization of this document.

Section 2 provides a brief summary of the physical setting of ANL-W, along with key information needed for successful excavation and disposal.

Section 3 through 5 provide the "recipes" for performing excavation at portions of the ANL-01 Ditch A and the ANL-35 Industrial Waste Lift Station Discharge Ditch, and all of the ANL-01 Industrial Waste Pond. Each section discusses the field implementation activities as well as any special conditions at each site. Each of these sections was written as a stand-alone document to complete the necessary work.

Section 6 provides remedial project information (such as cost estimates, schedules, and FFA/CO deliverables). Current cost plans for performing the excavation and disposal remedy are based on original estimates that have been refined for changing conditions and actual known costs.

A number of appendices are included as part of this Remedial Design Report. Some of these appendices include stand-alone documents (such as the Health and Safety Plan) that are necessary to complete the work yet would make this Remedial Design Report too cumbersome to read. While others include large pull-out maps or other detailed information that is not easily digested while reading this Report. Appendix A includes maps of each of the sites that show the plan and profile of the site, along with irrigation system and the irrigation spray pattern. Appendix B includes the Operations and Maintenance Plan that discusses how sites that will not be remediated to levels that would allow unrestricted use will be maintained to prevent the exposure pathway to the receptors. Appendix C provides the Quality Assurance Project Plan while Appendix D contains the Health and Safety Plan for performing the activities. Air modeling results are shown in Appendix E. Appendix F contains the working schedule for excavation work that will be performed. Appendix G contains the Instituational Control Plan for WAG 9. Each of these appendices will have to be routinely updated to incorporate changes in; EPA and/or State of Idaho DEQ regulations, ANL-W work procedures, and/or site conditions.

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2 PHYSICAL AND HYDROGEOLOGIC SETTING

2.1 Physical INEEL Site Description

The INEEL site occupies approximately 890 square miles (2,300 km^2) of the northwestern portion of the eastern Snake River Plain (SRP) in southeast Idaho. The INEEL site is nearly 39 miles (63 km) long from north to south and about 36 miles wide (east-west) in its broadest southern portion. The INEEL includes portions of five Idaho counties (Bingham, Bonneville, Butte, Clark, and Jefferson) and lies within Townships 2 to 8 N and Ranges 28 to 34 E, Boise baseline and meridian. Figure 2-1 shows the location of the INEEL with respect to the counties, State, and major rivers and mountain ranges.

The surface of the INEEL is a relatively flat, semiarid, sagebrush desert, with predominant relief being manifested either as volcanic buttes jutting up from the desert floor or as unevenly surfaced basalt flows or flow vents and fissures. Elevations on the INEEL range from 5,200 ft in the northeast to 4,750 ft in the central lowlands, with an average elevation of 4,975 ft.

Characteristics of the uppermost water-bearing units beneath ANL-W, plus regional and local physiographic, meteorologic, ecologic, geologic, and hydrologic settings of the ANL-W facilities are summarized in the following sections. This information is necessary for incorporation into this document because of it's importance to growing plants on ANL-W soils. This information was in the WAG 9-04 Comprehensive Work Plan and (where appropriate) has been updated with the latest information available to support remedial alternatives in the ROD. Specific details about each of the sites being remediated will be described in further detail in following chapters. This chapter only provides general background information relative to all sites requiring remediation.

2.1.1 Physiographic and Geomorphic Setting

ANL-W is in the southeastern portion of the INEEL and is roughly rectangular-shaped administrative area encompassing approximately 890 acres. ANL-W facilities are within a local topographically closed-basin. The surface gradually slopes from south to north, at approximately 30 ft per mile. Maximum topographic relief within the ANL-W administrative boundary is about 50 ft, ranging from 5110 ft above mean sea level on the north boundary, to 5160 ft on a basalt ridge to the southeast.

The Twin Buttes are the most prominent topographic features within the INEEL and are located southwest of ANL-W. East and Middle Twin Buttes rise 1100 and 800 feet, respectively, above the plain. Big Southern Butte, a composite acidic volcanic dome several miles south of the INEEL, is the most prominent single feature on the entire plain, rising approximately 2500 feet above the level of the plain.

2.1.2 Meteorology

The U. S. Weather Bureau established a monitoring station at the Central Facilities Area (CFA) in 1949. A 250-foot tower is also located just outside the east security fence surrounding ANL-W, however, this tower has not been in continuous operation for as long as the CFA station.

2.1.2.1 Air Temperature

Data has been collected from both 2 and 10 meters above the ground surface at ANL-W. The two-meter data set is limited in time from August 1993 to the present. The record presented is considered typical of temperature conditions in the vicinity of ANL-W. Although there is a much longer record available from the CFA station, the distance of ANL-W from that station precludes its use. Therefore, this data is presented here in that it more accurately portrays surface conditions at ANL-W. The maximum average monthly temperature during the time of record was 84.8°F in July. The minimum average monthly temperature of 7.9°F was recorded in December. Table 2-1 shows monthly mean, maximum, and minimum temperatures for the time of record at ANL-W. ANL-W anticipates that the growing season will begin in April if seeds are sown the previous fall. The growing season will last until mid October and allow harvesting activities to be completed before winter.

Table 2-1 Monthly Temperatures (8/93-7/95)

Month[a]	Mean[b]	Maximum[b]	Minimum[b]
January	22.5	31.6	12.9
February	25.1	36.7	13.8
March	35.1	48.4	22.1
April	42.9	56.2	27.8
May	52.1	65.2	37.1
June	59.3	73.7	41.0
July	67.2	84.8	46.5
August	65.3	83.3	44.7
September	57.0	75.7	36.2
October	41.8	56.6	27.5
November	22.7	35.4	8.9
Dec nber	19.8	29.0	7.9

[a] Time period August 1993 to July 1995.
[b] All values in degrees Farenhiet.

Figure 2-1 Location of INEEL Counties, Rivers and Mountain Ranges

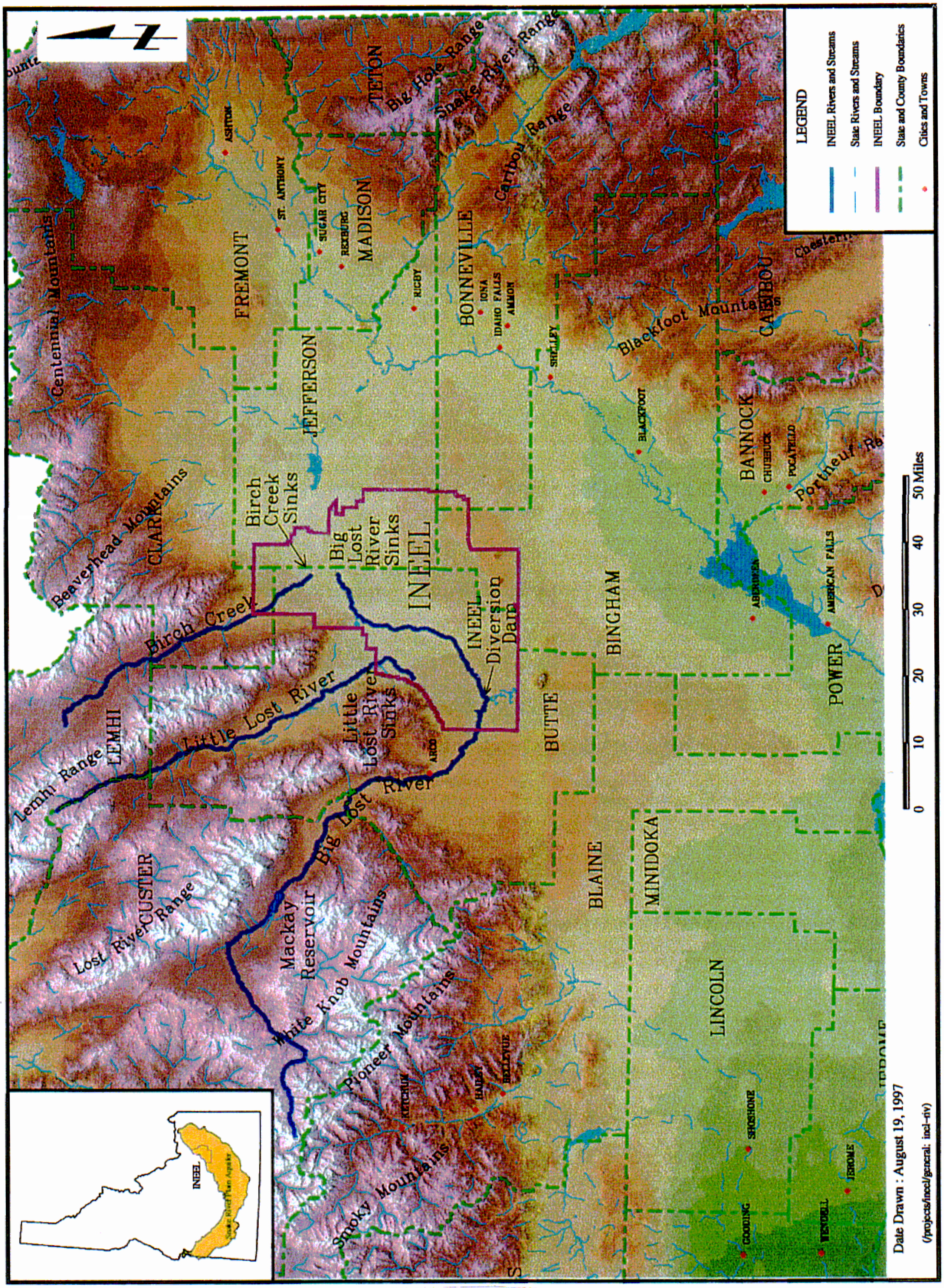

Figure 2-1 Location of INEEL Counties, Rivers and Mountain Ranges

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2.1.2.2 Precipitation

Precipitation and humidity are not measured at the ANL-W tower. However, the National Oceanic and Atmospheric Administration (NOAA) did an evaluation and is of the opinion that the use of CFA data for these parameters is reasonable. Precipitation was measured as rainfall and snowfall for the period January 1950 to December 1988. During this period, most of the precipitation was received in May and June and averaged 1.2 in. The annual total average was 8.71 in. As could be expected, most snowfall occurred during December and January. The monthly average snowfall event for December and January was 6.4 in. and 6.1 in., respectively. Wet-bulb temperature humidity measurements from CFA run from 1956 to 1961. The highest average occurred in the winter at 55%; a low average of 18% was recorded in the summer. Excavation activities will utilize watering to minimize the windblown contaminants.

2.1.2.3 Evaporation and Infiltration

Although NOAA does not measure pan evaporation at the INEEL, adjusted Class-A values have been made through regression analysis of other southeast Idaho sites. Data from 1950-51, 1958-59, 1963-64, and 1969-70 yielded an adjusted range of 40 to 46 in. per year. Other estimates for the INEEL have values of 36 in. per year from saturated ground, 32 to 36 in. per year from shallow lakes, and six to nine in. per year from native vegetation.

Evaporation rates (calculated from the drop in level of the Industrial Waste Pond during 1995) yield values between 0.43 in./day and 0.10 in./day for summer and winter, respectively. Infiltration is calculated by using the hydrologic equation and solving for the infiltration term. This yields values for the Industrial Waste Pond of between 0.36 in./day to 0.07 in./day for summer and winter, respectively.

2.1.2.4 Wind

Wind measurements at ANL-W are made at 10 meters and 250 ft above the ground surface. From this data, ANL-W is clearly subject to the same southwest and northeast winds as the rest of the INEEL. Winds tend to be diurnal, with up slope winds (those out of the southeast) occurring during the day and down slope winds (those out of the northeast) occurring at night. During the five-year time of record at ANL-W from 1990 to 1994, winds blew from the southeast 14% of the time, from the south-southeast 11% of the time, and from the northeast 10% of the time. Winds were calm during only 2.49% of the time on record. An annual total wind rose for the period 1990 to 1994 is shown in Figure 2-2.

2.1.2.5 Special Phenomena

A thunderstorm is defined by the National Weather Service as time during which thunder is heard at a given station. According to the definition, lightning, rain and/or hail are not required during this time. Following this strict definition, the ANL-W may experience two to three thunderstorms from June to August. Thunderstorms have been observed during each month of the year, but only rarely from November to February. Thunderstorms on the INEEL tend to be less severe than in the surrounding mountains because of the high cloud base. In many instances, precipitation from a storm will evaporate before reaching the ground. Individual storms may, however, occasionally exceed long-term average rain amounts for a storm.

Local thunderstorms may also be accompanied by micro bursts, which can produce dust storms and occasional wind damage. Thunderstorms may also be accompanied by both cloud-to-ground and cloud-to-cloud lightning.

Because there are no permanent, natural, surface water features near ANL-W flooding is not a major concern. The facility has been inundated in the past by rapid snow-melt events. To control this, a diversion dam was constructed south of the facility. This dam has a gate that, when closed, diverts water into the adjacent drainage and from there directly into the Industrial Waste Pond. A temporary earthen dam has been constructed before the inlet to the Industrial Waste Pond and also at the outlet to the Industrial Waste Pond. The inlet dam is used to prevent the special rain events from reaching the pond and the outlet dam is used to force the current discharge wasters that have been diverted into the overflow ditch to the North.

2.1.3 Soils

Soil samples have been collected in and around ANL-W to support specific investigations. Most recently, soil and plant sample results from the confirmation soil sampling in the phytoremediation sites was conducted in 2003. These results form the basis for the identification of the hot spots in Ditch A and the Industrial Waste Lift Station Discharge Ditch. As previously stated, the analytical information will be used to identify the soils to be removed, additional soils may have to be removed depending on the results of real time sampling.

2.1.3.1 Soil Type

The ANL-W site is located on an alluvial plain of the Big Lost River. The thickness of the surficial sediment in the vicinity of the ANL-W site is shown in Figure 2-3. Depths range from outcroppings at the surface to depths of 4.2 m (14 ft). In general, the depths of surface soils above the basalt tend to increase from approximately 60 cm (2 ft) on the east side of the area to a depth of 4.2 m (14 ft) near the west side of the security fence.

The general soil types for ANL-W are shown in Figure 2-4. The two types of soils shown are 425-Bondfarm-Rock outcrop-Grassy Butte complex and 432-Malm-Bondfarm-Matheson complex. As shown in the figure, the soil type 425-Bondfarm-Rock outcrop-Grassy Butte complex is found over all the sites in OU 9-04. This soil consists of 40% Bondfarm loamy sand, 30% rock outcrop, and 20% Grassy Butte loamy sand. The Bondfarm soil is on the concave and convex side slopes and is surrounded by areas of the Grassy Butte soils, rock outcrop is in the areas of slightly higher than areas of Bondfarm soils, and the Grassy Butte soil is in hummocky areas. Also included in this complex are about 10% Matheson loamy sand, a soil that is similar to the Grassy butte soils but that is less than 40 in. deep to bedrock, and Terreton loamy sand. The Bondfarm soil is shallow and well drained. It formed in eolian material. Typically, the surface layer is light brownish-gray loamy sand about 10 cm (4 in.) thick. The subsoil and substratum are very pale-brown sandy loam 35 cm (14 in.) thick. Basalt is at a depth of 45 cm (18 in.). The soil is calcareous throughout and has a layer of lime accumulation at a depth of 4 in. The permeability of the soil is

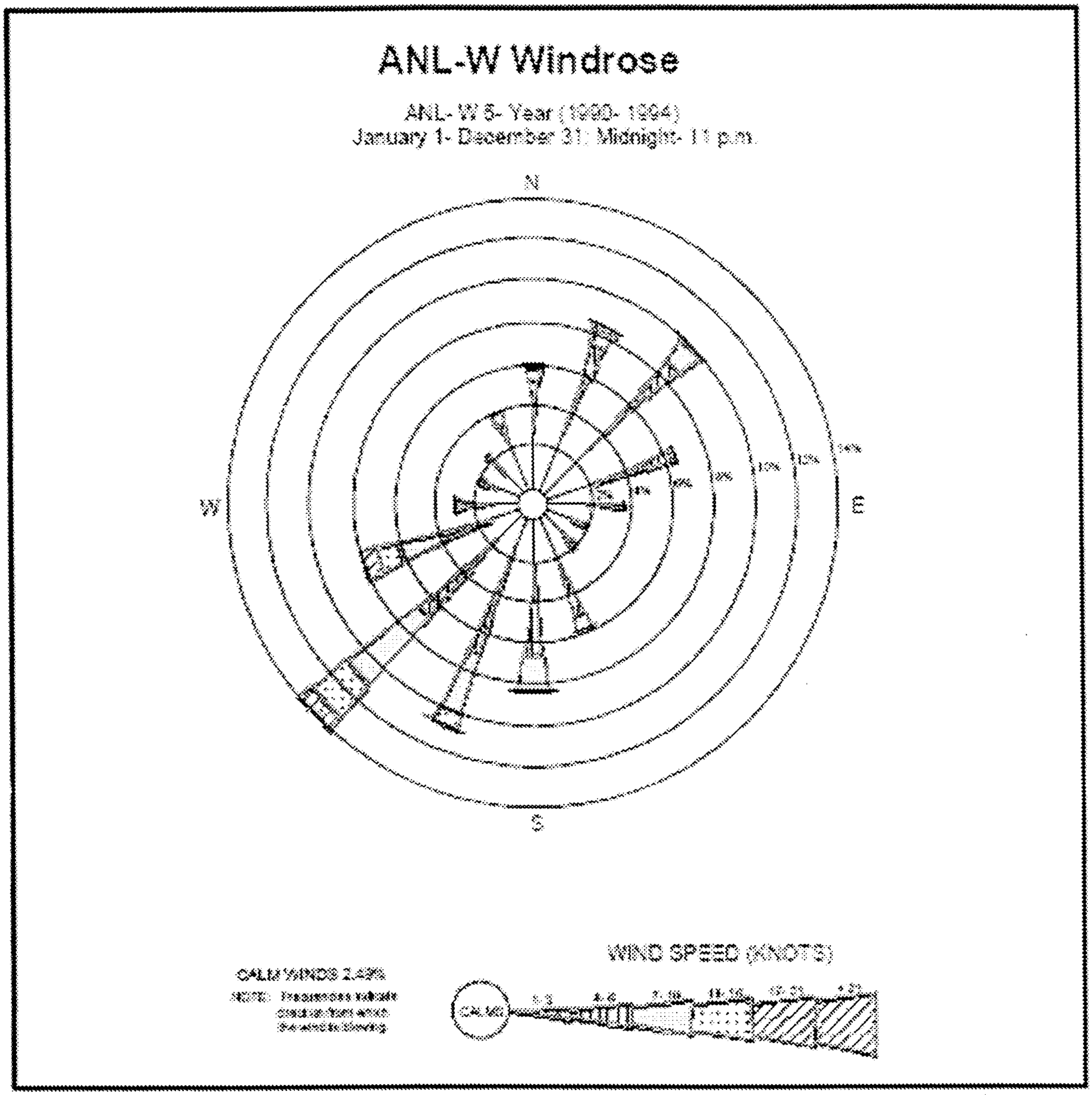

Figure 2-2 ANL-W 5 Year Wind Rose 1990-1994

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Figure 2-3 Thickness of Surficial Material above Basalt

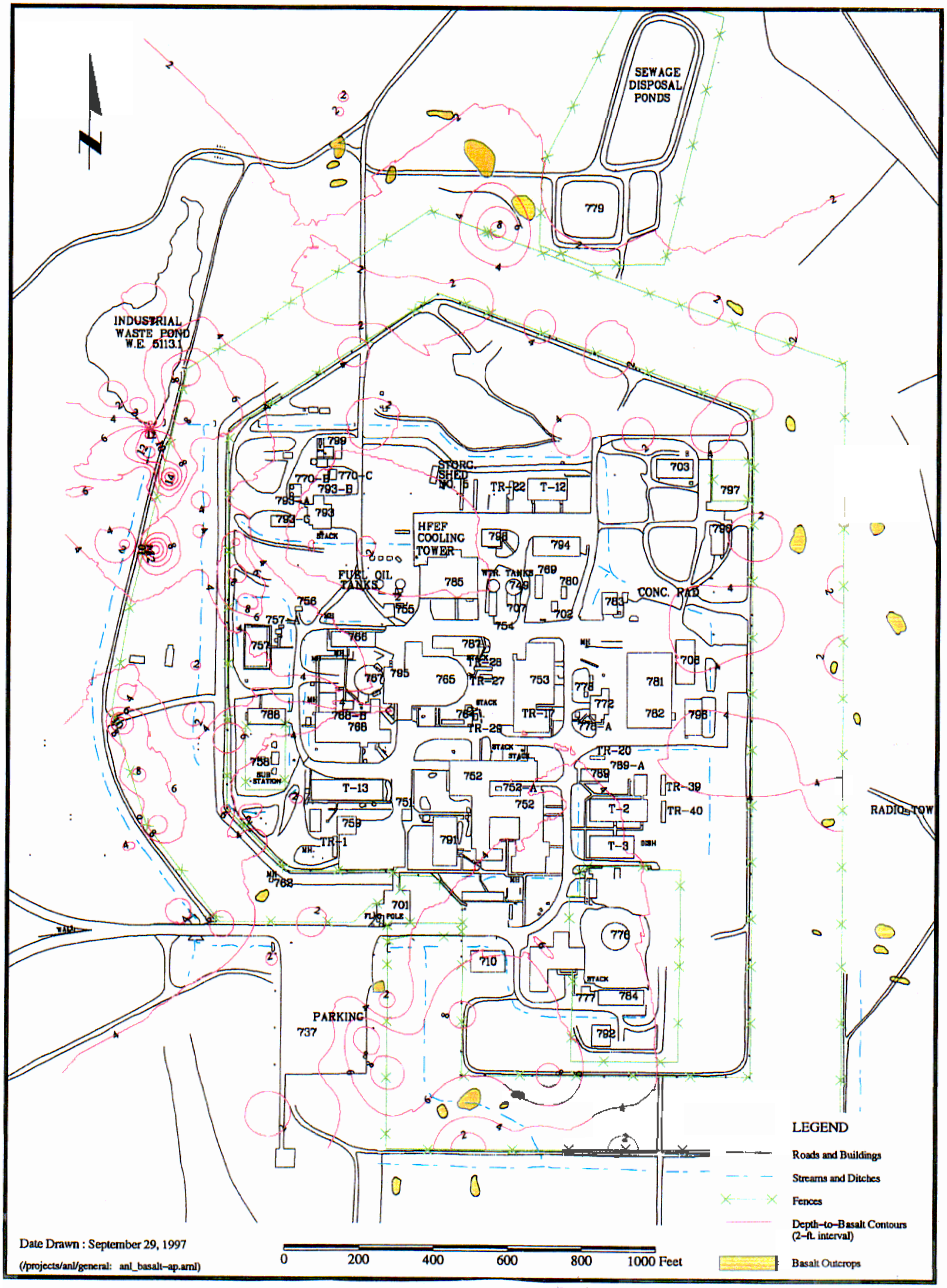

Figure 2-3 Thickness of Surficial Material above Basalt

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Figure 2-4 General Soil Types in the Vicinity of ANL-W

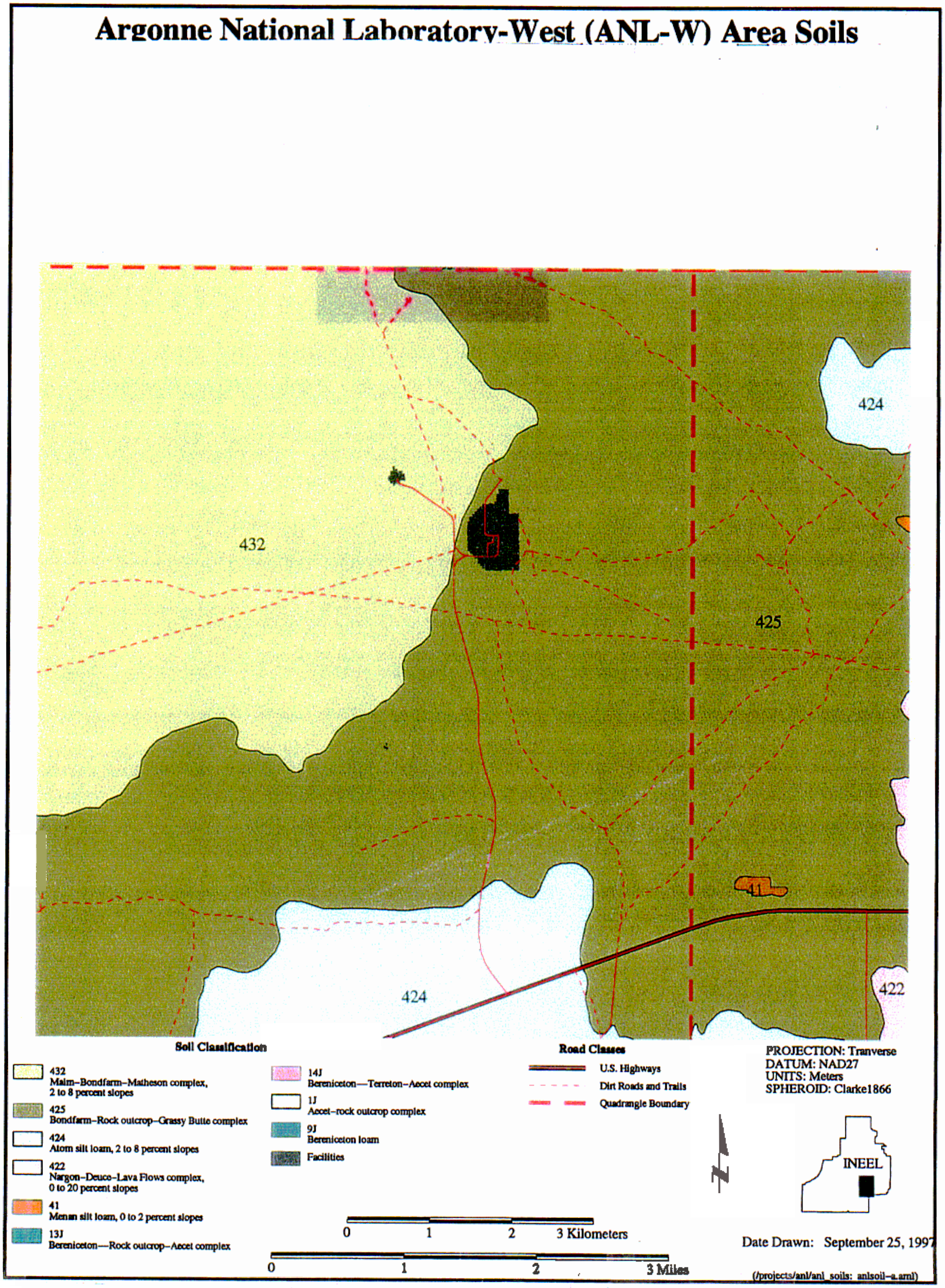

Figure 2-4 General Soil Types in the Vicinity of ANL-W

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moderately rapid. Effective rooting depth is 25 to 50 cm (10 to 20 in.). Available water capacity is low. Surface runoff is slow or medium, and the hazard of erosion is slight or moderate. The hazard of soil blowing is very slight.

Rock outcrop consists of exposed basalt rock. Crevices in the rock contain some soil material that supports a sparse stand of grasses, forbs, and shrubs.

The Grassy Butte soil is very deep and somewhat excessively drained. It formed in sandy eolian material. The underlying material to the depth of 152 cm (60 in.) or more is grayish-brown and gray loamy sand. The soil is calcareous throughout and has a layer of lime accumulation at a depth of 48 cm (19 in.). The permeability of the soil is rapid. Effective rooting depth is 152 cm (60 in.) or more, and the available water capacity is low or moderate. Surface runoff is very slow or slow. The hazard of soil blowing is very high.

2.1.3.2 Soil Agronomic Analysis

The agronomic analysis consists of general information such as electron conductance; saturated paste pH; organic matter percent; percent lime, sand, silt, and clay; texture, sodium, cation exchange capacity (CEC), base saturation, extractable calcium, magnesium, sodium, potassium, phosphorous, soluble pH, grain size, and acid/base potential. Table 2-2, shows the agronomic analysis results for cesium-contaminated and inorganically-contaminated soils.

2.1.3.3 Soil-Contaminant Concentrations

For the ANL-W sites that are undergoing excavation and disposal, the contaminants and concentrations vary for each site. Table 2-3 summarizes the site, contaminant, and the contaminant remediation goal. As required by the EPA, the contaminant concentration for each site was determined by calculating the 95% Upper Confidence Limit (95% UCL) of the mean. Since the 95% UCL is a calculated statistic, the final result varies greatly with the outliers in a data set. If the data does not contain outliers, the 95% UCL value is only slightly above the mean. However, if outliers are encountered, the 95% UCL concentration increases significantly over the mean.

2.1.3.4 Surface Water

Recharge to the Snake River Plain Aquifer (SRPA) in the vicinity of ANL-W occurs as snow melt or rain. During rapid snow melt in the spring, moderate recharge to the aquifer can occur. However, high evapotranspiration rates during the summer and early fall prevents significant infiltration from rainfall during this period. Because of the distance from the surrounding mountains and permanent surface-water features (i.e., the Big Lost River), the SRPA beneath ANL-W is unaffected by underflow or recharge from these sources.

Table 2-2 Agronomic Soil Sample Analysis

Analysis	Units	Interceptor Canal Mound (cesium-contaminated soil)	Main Cooling Tower Blowdown Ditch (inorganic-contaminated soil)
Electron Conductance	mmho/cm	1.76	0.88
pH	pH units	7.41	8.57
Percent Organic Matter	%	2.35	1.59
Lime	%	15.3	5.41
Sand	%	45	47
Silt	%	42.1	34.6
Clay	%	12.9	18.4
Texture	N/A	Loam	Loam
Na Cation Exchange Capacity	mg/kg	2500	TBD
Cation Exchange Capacity	meq/100 g	10.9	TBD
Base Saturation Cation Exchange Capacity (CEC)	% CEC	2.84	112
Extractable Calcium	mg/kg	5200	5310
Extractable Magnesium	mg/kg	360	510
Extractable Sodium	mg/kg	20	76
Extractable Potassium	mg/kg	430	438
Extractable Phosphate	mg/kg	30	48
Soluble Sulfate	mg/kg	26	71
Soluble Calcium	mg/kg	270	N/A
Soluble Magnesium	mg/kg	39	N/A
Soluble Sodium	mg/kg	11	76

mmho/cm milli mho per centimeter

meq/100g milliequivalence per 100 grams

N/A Not Applicable

Table 2-3 Final Remediation Goals for all WAG 9 Sites that Required Remedion.

Receptor	Site	Contaminant	95% UCL Concentration[1]	RG* Concentration[1]
Human Health	Industrial Waste Pond (ANL-01)	Cesium-137	29.2	23.3
Ecological	Industrial Waste Pond (ANL-01)	Chromium III	1,030	500
Ecological	Industrial Waste Pond (ANL-01)	Mercury	2.62	0.74
Ecological	Industrial Waste Pond (ANL-01)	Selenium	8.41	3.4
Ecological	Industrial Waste Pond (ANL-01)	Zinc	5,012	2,200
Ecological	Ditch A (ANL-01)	Mercury	3.94	0.74
Ecological	Industrial Lift Station Discharge Ditch (ANL-35)	Silver	352	112

[1] - Concentrations in mg/kg or pCi/g

* - Backward calculated risk-based concentration at the 1E+04 level for humans and ten times background for ecological receptors.

No permanent, natural, surface water features exist near the ANL-W site. The existing surface-water features (e.g., drainage ditches, Industrial Waste Pond, and Sanitary Evaporation Ponds) were constructed for the collection of intermittent surface runoff at ANL-W or waste water disposal. A natural drainage channel has been altered to discharge to the Industrial Waste Pond via the Interceptor Canal. Under unusual conditions when the air temperature has been warm enough to cause snow-melt, but the ground has remained frozen precluding infiltration, surface runoff along this channel has discharged to the Industrial Waste Pond. This condition most recently occurred during the spring of 1995. During that time, flow was visible from the surrounding basin into the Industrial Waste Pond for approximately four days. However, at no time did any water discharge from the pond to the downstream channel. Before 1995, the most recent occurrence of this situation was in 1976.

2.1.3.5 Groundwater

Estimates show nearly 2×10^9 acre-feet of water exist in the SRPA with water usage within the boundaries of the INEEL being approximately 5.6×10^3 acre-feet per year. From 1979 to 1994, the ANL-W withdrew an average of 138 million gallons of water per year from the SRPA. Principal uses of the water are for plant cooling water operations, boiler water, and potable water.

Regional flow in the SRPA is from northeast to southwest. Depth to the SRPA near the ANL-W facility is approximately 647 ft BLS, based on the most recent water-level measurements. Transmissivities of the SRPA range from 29,000 to 556,000 ft^2 per day, based on aquifer test data from two production wells at ANL-W.

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3 TECHNICAL AND FUNCTIONAL REQUIREMENTS

The following sections outline the technical and functional requirements for the Excavation and Disposal of contaminated soils in the Industrial Waste Pond, and portions of Ditch A, and the Industrial Waste Lift Station Discharge Ditch.

3.1 Process Flow

Process flow for the remediation of the contaminated soils includes excavation of the soils within the area of contamination, transportation of the soils from the remedial action site to the appropriate disposal facility (i.e., ICDF for the IWP of soils, CFA Landfill for the soils in the Ditches), and disposal of the soils at the specified disposal facility.

The process flow presented consists of distinct functions that will be performed at each site because of differences in types and levels of contaminants and disposal locations. Sections 4, 5, and 6 of this document were written to identify the specific needs of Ditch A, Industrial Waste Lift Station Discharge Ditch, and the Industrial Waste Pond, respectively.

3.1.1 Excavation of Soils

The empty roll-off container (or end-dump truck) will be radiologically surveyed upon arrival in the staging area located on the West side of the Industrial Waste Pond. After being approved for use, the truck will be fitted with a disposable liner leaving the top flaps on the sides, back, and front laying over the box to ensure that the soil will not be in direct contact with the box during the loading. If the roll-off containers are used, a designated truck outfitted with a cable hoist is used to transport the container to the area where excavation is occurring. This dedicated transport truck will be used only in the dig site and is being used to minimize the potential transportation of contaminants outside the dig site. With the container remaining on the truck, the container is filled with contaminated soil then transported to a station set up for sealing the liner, placing the tarp back over the roll-off container, screening the exterior of the container for contamination, and performing any necessary decontamination of the container. The screening of containers for contamination will be completed and any decontamination of the exterior surfaces of the container would be performed prior to being approved for shipment. Once these tasks have been adequately performed, the truck carrying the container proceeds to a second staging area where the filled roll-off containers are placed awaiting transport to the ICDF or CFA landfill. If the end dump trucks are used the activities will remain the same with the exception being that the transport truck will be loaded at the edge of the contaminated site verses the switching of the roll-off containers to a designated truck.

3.1.2 Transportation of Contaminated Soils

The ICDF Subcontractor will be responsible for all activities within the ICDF. This information is being provided to the Subcontractor to further the understanding of the entire process involved in the remediation, transport, and disposal of the contaminated soils.

Transportation of contaminated soils from the remediation sites to the ICDF or the CFA Landfill shall comply with this Work Plan. The appropriate paperwork for transport and disposal of the contaminated soil is provided to the drivers. A container (roll-off or end dump truck) from the second staging area at the remediation site is picked up for transport to the ICDF. Following the specified route, the container is transported to the ICDF where the truck is weighed with the container in place. With the acceptance of the container at the ICDF, the paperwork related to the loaded container is turned over to the ICDF personnel and the container is off-loaded in the full container staging area at the ICDF. The truck then proceeds to pick up an empty container from the appropriate staging area at the ICDF for the return trip to the remediation site. Once at the remediation site, the truck off-loads the empty roll-off container.

3.1.3 Disposal of Contaminated Soils

The ICDF Subcontractor will be responsible for all activities within the ICDF. This information is being provided to the Subcontractor to further the understanding of the entire process involved in the remediation, transport, and disposal of the contaminated soils.

The completed paperwork is submitted to the designated ICDF responsible person at the pit site. If used, the tarp will be removed from the container, the rear gate opened, and the load (including the liner) dumped into the landfill at a specified location. The rear gate will then be closed, the tarp affixed, and the container surveyed for contamination. If external contamination is detected, the container will be decontaminated. Once released from the survey, the container will be transported to the empty container staging area at the ICDF for a final inspection. It will remain in the empty container staging area until the Subcontractor picks it up for the return trip to the remediation sites previously stated in the WAG 9-04 ROD.

,xxxx the use of phytoremediation at ANL-W is contingent on successful bench-scale testing on the ANL-W contaminants. If the bench-scale testing is not successful at removing the contaminants, the contingent remedy of excavation with on-INEEL disposal could be utilized to remediate the sites. The main criteria for selection of phytoremediation for ANL-W was to remediate the sites within a reasonable period of time. ANL-W used seven years as a reasonable time period for phytoremediation and calculated the cost estimates in the ROD. A strict comparison of the costs associated with phytoremediation (2.8 million) to excavation and disposal (5.8 million) would indicate that phytoremediation could be utilized for 14.5 years for similar costs. However, a simple comparison between costs should not be made since excavation and disposal will guarantee that the remediation goals are met and phytoremediation cannot. So, DOE has assumed a 30% uncertainty with the 14.5 years which would result in 10-year time frame on the low end and 19 years on the high end. So for the determination on which alternative to use, DOE used the 10-year time frame for phytoremediation.

Table 3-2 Cleanup Remedy to be Utilized.

Receptor	Site	Remedy Selection
Ecological	Ditch A (ANL-01)	Excavation with disposal at the CFA Bulky Waste Landfill
Human Health and Ecological	Industrial Waste Pond (ANL-01)	Excavation with disposal at the Idaho CERCLA Disposal Facility
Ecological	Industrial Lift Station Discharge Ditch (ANL-35)	Excavation with disposal at the CFA Bulky Waste Landfill

4 ANL-01 (DITCH A)

This section discusses information specific to release site ANL-01 Ditch A and the work that will be performed during Excavation and Disposal of the remaining hot spots. Although sampling activities conducted during confirmation of phytoremediation were conducted using a random pattern the possibility exists that the contaminated area are larger or smaller than those shown in the map found in Appendix A. The necessary work has been subdivided into major tasks associated with excavation, transportation to the CFA Landfill, disposal, and regrading activities to ANL-01 Ditch A. Generic activities that are common to all sites being remediated at ANL-W (such as the Health and Safety Plan and the Quality Assurance Project Plan) can be found in the appendices. The plan map and other figures for Ditch A are quite large and are included in Appendix A.

4.1 History of Site

The location of Ditch A with respect to ANL-W is shown in Figure 1-3. Ditch A conveyed industrial wastewater from the EBR-II Power Plant auxiliary cooling tower to the Industrial Waste Pond. To date, Ditch A is still being used to transport storm-water runoff, as well as intermittent auxiliary cooling tower waters. Discharges to Ditch A flow into the Main Cooling Tower Blowdown Ditch and ultimately into the Industrial Waste Pond. The mercury contamination is most likely the result of slight concentrations in the acid used to regenerate the ion beds in the EBR-II Power Plant.

4.2 Contaminants

Mercury is a contaminant of concern (COC) for ecological receptors (Functional Group AV132, Sora) only and was detected in 74% (27/38) of the samples analyzed in Ditch A. All of the mercury detections exceeded the upper limit of the 95% UCL background concentration (0.074 mg/kg). The source of the mercury is most likely from trace concentrations of mecuric sulfate found in the sulfuric acid that was used to regenerate the ion beds in the EBR-II Power Plan. The maximum detected concentration of 4.1 mg/kg was detected at location #10W in the surface sample (0 to 6 in.); while the UCL concentration for mercury in Ditch A was 3.94 mg/kg. In all but one instance, the surface samples at each location contained the highest concentrations of mercury with the exception of #26E. The mercury contamination in Ditch A is spread through the entire length, with the highest concentrations near the intersection of the Main Cooling Tower Blowdown Ditch and Ditch A. The mercury concentrations also decrease with increasing depth, with the highest concentrations in the surface samples (0 to 6 in.). Therefore, the maximum extent of contamination is the dimensions of both the eastern and western parts of Ditch A (5 ft wide and 400 ft long) and the vertical extent contained to the surface soils (0 to 6 in.).

4.3 Receptors of Concern

Mercury poses an unacceptable ecological risk to functional group AV 132 with the Sora as a common species. The current concentrations for mercury pose a fifty fold increase in the Hazard Quotient for this Functional Group as compared to background concentrations of mercury.

4.4 Remediation Goal

The established remediation goal for the Ditch A mercury contamination is identified in the WAG 9

ROD as 0.74 mg/kg. This is for ecological receptors in the avian 132 functional group. Mercury levels do not pose unacceptable risks to humans.

4.5 Preexcavation Activities

Preexcavation activities involve creating a paper-trail documentation record of analytical results of past sampling. Previous sampling results will be copied from *WAG 9-04 Comprehensive RI/FS* and attached as supplemental information to the required INEEL managing contractor's documentation packages. The soil from ANL-01 Ditch A will be shipped to the CFA Landfill Complex following the INEEL Waste Acceptance Criteria (DOE/ID-10381) Section 4.3. ANL-W will follow internal instructions in accordance with item 6.3 of Section 3.1 *ANL-W Environment, Safety, and Health Manual,* for shipment of radioactive and nonradioactive items of equipment material and hazardous wastes. ANL-W will also submit the appropriate forms to the INEEL managing contractor and receive signed concurrence prior to shipment. The necessary forms are described in the following paragraph.

The INEEL managing site contractor will require a waste stream-specific documented waste determination prior to accepting the waste. The Waste Generator Services Group will then review the waste stream-specific determination and a copy f the signed material profile data sheet and complete the generator part of the INEEL Form 435.27 for logging the waste. ANL-W anticipates that the review and concurrence by the managing site contractor will take two weeks. However, ANL-W will send the forms approximately one month prior to the planned shipping date to allow for any unforseen delays.

4.6 Excavation Activities

The extent of contamination in Ditch A was determined (in the RI/FS) to be a maximum of 400 ft long, 5 ft wide, and 0.5 ft deep (37 yd^3). The lateral extent of contamination consisted of the wetted area along the ditch bottom with no lateral movement of contaminants. The contamination was fairly homogeneously distributed vertically from the surface to the basalt. The volume of soil that will be removed has been estimated to be up to 37 yd^3. The excavation will be initiated utilizing a combination of heavy equipment and manual labor. A majority of the contaminated soil can be removed using a front-end loader and dump trucks. However, because of the irregular top surface of the basalt, manual labor will be utilized to remove the soil that the heavy equipment cannot remove around culverts and irregular basalt tops. ANL-W anticipates manual labor will also be used to remove the soil near the drainage culverts .

The first step in the soil excavation in Ditch A will be to mark all existing underground utilities (such as fire-hydrant supply lines, water supply lines, sewer lines, buried electrical lines, overhead power lines, cathodic protection lines, and security warning devices) within 50 ft of the contaminated zone. This will be accomplished by using existing site drawings and onsite inspections by key Plant Services personnel and safety engineers. ANL-W will complete the digging/excavation permit in accordance with Section 4.4H of the *ANL-W Environment, Safety, and Health Manual.* Temporary stands will be spaced approximately 50 ft apart around the Ditch A to set up a contaminant reduction zone. The temporary stands will have ring hangers approximately three ft off the ground that will be used to string a yellow and black poly rope between the stands. Signs will be attached to the rope warning people that only authorized personnel are allowed in the contaminant reduction zone. The surface of Ditch A will be wetted using a garden hose and sprayer attachment to control dust or by using the water truck with side discharge to spray up to 20 feet across the ditch during excavation activities. Watering should take approximately 10 minutes at each location along the ditch.

Prior to initiating the remediation effort at Ditch A, a safety meeting will be held for all workers to define the hazards associated with the removal action. The workers will be dressed in Occupational Safety and Health Administration (OSHA) level-D personnel protective equipment (PPE). As a minimum the PPE will consist of leather shoes, leather gloves, safety glasses, hardhats, and coveralls. In addition, there will be no eating, drinking, smoking, or gum chewing in the contaminant reduction zone.

The initial excavation of soil will be conducted using the front-end loader and dump truck. A laborer will assist the front-end-loader operator in use and control of the bucket. The excavated material will be placed in the dump truck stationed close to Ditch A. This process will be repeated until the front-end loader has excavated as much soil as possible from the contaminated ditch. The laborers will then use shovels to manually remove the remaining soil from areas around culverts in the ditch and place it into the front-end-loader bucket. The laborers will then use shovels and brooms if necessary to remove as much soil as possible from the top of basalt in the ditch bottom. The front-end loader will dispose of this material in the dump truck as needed.

When a dump truck has been filled, it will be carefully inspected to remove any additional material accidentally deposited on the outside of the truck box. Any soil removed from the truck will be added to the dump truck. The dump truck will be driven out of the contaminated zone over to building 783, where a tarpaulin cover will be attached to prevent loss of material during transit. Officials at the CFA Landfill Complex will be notified of a pending shipment; completed documentation will accompany the shipment. When the dump truck returns to ANL-W, the truck will be used to remove additional soil from Ditch B. When all soil has been shipped or prior to the dump truck being used for other non-CERCLA jobs, the dump truck must be washed at the cooling tower decontamination wash pad.

The cooling tower decontamination wash pad consists of a concrete bermed area that is sloped to a centralized drain. A high pressure washer will be used, along with shovels and brooms, to remove all the ditch soil from the truck. Large debris and/or material that is firmly attached to the truck can be removed using a shovel or a scrub brush. After washing the dump truck, it will be moved off the washpad and moved to building 783. The laborers will wash the scrub brushes, shovels, brooms, and other equipment used in Ditch A using the high-pressure washer. These tools will be air dried and returned to the tool crib. Laborers will also use the high pressure washer to clean the wash pad of all soil residue. The decontamination procedure is included in the ANL-W Environmental Procedure Manual and referenced in Appendix C (Quality Assurance Project Plan). A sample of the wash-pad water will be collected from the storage tank and analyzed.

When analysis results for the decontamination water are received, a determination as to final disposition will be made. If the decontamination water contains no RCRA wastes, the water will either be pumped into Ditch A or pumped into the evaporation holding tank next to the wash pad. However, if the decontamination water contains hazardous waster, it will be managed in accordance with the substantive aspects of IDAPA 58.01.05008 (Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities). The wastes would be pumped into 55-gal drums and transferred to an ANL-W cargo container, pending disposal in accordance with task 6.3 of Section 3.1 Shipment of Radioactive and Nonradioactive Items of Equipment, Material, and Hazardous Wastes of the *ANL-W Environment, Safety, and Health Manual..*

4.7 Confirmation Sampling

Confirmation samples are typically collected after the site has been remediated to show that remediation goals established in the ROD have been attained. However, validation sampling cannot be completed at the Ditch A site after the contaminated soil has been removed. The contaminated zone in Ditch B has been defined as the soil in the ditch to the top of the basalt. The soil on top of the basalt will be removed, leaving only small volumes of soil that are in cracks and fissures of the basalt remaining. The small volumes of soil that remain can't be sampled and used as confirmation samples because the soil structure and concentrations are different from the surface loess. Thus, completely removing the soil in Ditch B and documenting the removal with photographs satisfies the confirmation sampling requirement.

4.8 Regrading

After the soil has been removed to basalt and documented, clean backfill material can be added to Ditch A. This clean backfill material will be trucked to ANL-W from the borrow pit located 2 miles Northwest of ANL-W. The backfill material will be applied in approximately 4 in. deep lifts, and compacted using the tires and weight of the front-end loader and gas-powered hand tampers around the culverts. Soil application will continue until the ditch-bottom grade is at the % grade line running between the culverts. ANL-W will potentially use a scraper blade on the bottom and side-slopes of the ditch to its original shape.

4.9 Revegetation

Revegetation of this ditch will not be conducted. This ditch lies within the ANL-W fenced area and will be sprayed semiannually with a herbicide and a soil sterilizer to prevent plant growth. This ditch will continue to carry both industrial waste water and storm water runoff and will continue to be used for these purposes.

5 ANL-35 INDUSTRIAL WASTE LIFT STATION DISCHARGE DITCH

This section discusses information specific to release site Industrial Waste Lift Station Discharge Ditch and the work that will be performed during the 2-year phytoremediation field test. The necessary work has been subdivided into major tasks associated with preplanting, planting, irrigation, harvesting, and postharvesting activities specific to the Industrial Waste Lift Station Discharge Ditch. Generic activities that are common to all sites being remediatied at ANL-W (such as the Health and Safety Plan and the Quality Assurance Project Plan) can be found in the appendices.

5.1 History of Site

The location of the Industrial Waste Lift Station Discharge Ditch is shown in Figure 1-3. The Industrial Waste Lift Station Discharge Ditch, also known as the North Ditch, is located inside the ANL-W security fences. The ditch is approximately 500 foot long with a bottom width of 3 to 4 foot. At any one time, there is approximately 2 to 3 in. of standing water in the ditch from the 2-5 gpm discharge. The ditch receives industrial waste water, primarily cooling water, photo processing wastes (e.g., photo developers, fixers, stabilizers, and acids), and overflows from several retention tank that may contain ethanol, sodium hydroxide, and some radionuclides from a variety of ANL-W facilities. The ongoing and future discharges of these processing wastes (such as hazardous constitutents/corrosives) are regulated under RCRA, CERCLA will still regulate radionuclide releases. The cleanup action specified in this ROD addresses only past releases of these processing wastes and those contaminants in the Industrial Waste Lift Station Discharge Ditch.

5.2 Contaminants of Concern

Soil samples were collected from this site on three separate occasions—by DOE in 1989, Chen Northern in 1988, and by ANL-W in 1994. Data from the three studies were combined into one data set and organized according to the analytes that were collected (i.e., organics, inorganics, radionuclides, and dioxin/furans). Appendix A of OU 9-04 *Comprehensive RI/FS* shows the sampling location plan map, color-intensity profile maps, and statistics for COC (by pathway) for all samples that were collected.

Risk assessment results indicate there are no contaminants that pose unacceptable risks to humans and only one contaminant (silver) that has unacceptable risks to ecological receptors. All three studies were analyzed for silver which was detected at 87% (33 of 39) of the sample locations, with the highest detection (352 mg/kg) at #41. (Sample location #41 is located in the middle of the ditch.) The maximum concentration was used in risk assessment of the UCL value because of the small data set and large standard deviation in the data. However, since high concentrations were also detected at other locations (grid 18, ND03, 15, 18, and 19) the horizontal extent of contamination was defined as the entire length of the ditch. No trends on the vertical extent of contamination were detected for silver. The average soil depth on top of the basalt (1.0 ft) was used to define the vertical extent of contamination. Thus, the extent of contamination at the Industrial Waste Lift Station Discharge Ditch is defined as 15 × 500 × 1 ft.

5.3 Remediation Goal

The RG as determined in the WAG 9 ROD for silver is 112 mg/kg, which is calculated at 10 times the INEEL background concentration for silver.

5.4 Receptors of Concern

Silver poses an unacceptable ecological risk to functional group "plants". The current concentrations for silver pose a thirty fold increase in the Hazard Quotient for this Functional Group as compared to background concentrations of silver.

5.5 Preexcavation Activities

Preexcavation activities involve creating a paper-trail documentation record of analytical results of past sampling. Previous sampling results will be copied from *WAG 9-04 Comprehensive RI/FS* and attached as supplemental information to the required INEEL managing contractor's documentation packages. The soil from ANL-35 Industrial Waste Lift Station Discharge Ditch will be shipped to the CFA Landfill Complex as a conditional waste. The specification for conditional wastes are found in the INEEL RRWAC Section 4.3.2. ANL-W will follow internal instructions in accordance with item 6.3 of Section 3.1 *ANL-W Environment, Safety, and Health Manual,* for shipment of radioactive and nonradioactive items of equipment material and hazardous wastes. ANL-W will also submit the appropriate forms to the INEEL managing contractor and receive signed concurrence prior to shipment. The necessary forms are described in the following paragraph.

The INEEL managing site contractor waste characterization forms (L-435.10 through L-435.13), along with the Solid Waste Log Form (L-103), and Technical Procedure (713) will be completed and submitted to the site contractor to show that no DOE radioactive contamination has been added to the soils. These INEEL managing site contractor will review these forms and upon concurrance the Industrial Waste Lift Station Discharge Ditch soils can be shipped. ANL-W anticipates that the review and concurrence by the managing site contractor will take two weeks. However, ANL-W will send the forms approximately one month prior to the planned shipping date to allow for any unforseen delays.

5.6 Excavation Activities

The extent of contamination in Industrial Waste Lift Station Discharge Ditch was determined (in the RI/FS) to be a maximum of 500 ft long, 1 ft wide, and 1 ft deep (74 yd^3). The lateral extent of contamination consisted of the wetted area along the ditch bottom with no lateral movement of contaminants. The contamination was fairly homogeneously distributed vertically from the surface to the basalt. The volume of soil that will be removed has been estimated to be up to 74 yd^3. The excavation will be initiated utilizing a combination of heavy equipment and manual labor. A majority of the contaminated soil can be removed using a front-end loader and dump trucks. However, because of the irregular top surface of the basalt, manual labor will be utilized to remove the soil that the heavy equipment cannot remove around culverts and irregular basalt tops. ANL-W anticipates manual labor will also be used to remove the soil near the drainage culverts .

The first step in the soil excavation in Industrial Waste Lift Station Discharge Ditch will be to mark all existing underground utilities (such as fire-hydrant supply lines, water supply lines, sewer lines, buried electrical lines, overhead power lines, cathodic protection lines, and security warning devices) within 50 ft of the contaminated zone. This will be accomplished by using existing site drawings and onsite inspections by key Plant Services personnel and safety engineers. ANL-W will complete the digging/excavation permit in accordance with Section 4.4H of the *ANL-W Environment, Safety, and Health Manual.* Temporary stands will be spaced approximately 50 ft apart around the Industrial Waste Lift Station Discharge Ditch to set up a contaminant reduction zone. The temporary stands will have ring hangers approximately three ft off the ground that will be used to string a yellow and black poly rope between the stands. Signs will be attached to the rope warning people that only authorized personnel are allowed in the contaminant reduction zone. The surface of the Industrial Waste Lift Station Discharge Ditch will be wetted using a garden hose and sprayer attachment to control dust or by using the water truck with side discharge to spray up to 20 feet across the ditch during excavation activities. Watering should take approximately 10 minutes at each location along the ditch.

Prior to initiating the remediation effort at the Industrial Waste Lift Station Discharge Ditch, a safety meeting will be held for all workers to define the hazards associated with the removal action. The workers will be dressed in Occupational Safety and Health Administration (OSHA) level-D personnel protective equipment (PPE). As a minimum the PPE will consist of leather shoes, leather gloves, safety glasses, hardhats, and coveralls. In addition, there will be no eating, drinking, smoking, or gum chewing in the contaminant reduction zone.

The initial excavation of soil will be conducted using the front-end loader and dump truck. A laborer will assist the front-end-loader operator in use and control of the bucket. The excavated material will be placed in the dump truck stationed close to the Industrial Waste Lift Station Discharge Ditch. This process will be repeated until the front- end loader has excavated as much soil as possible from the contaminated ditch. The laborers will then use shovels to manually remove the remaining soil from areas around culverts in the ditch and place it into the front-end-loader bucket. The laborers will then use shovels and brooms if necessary to remove as much soil as possible from the top of basalt in the ditch bottom. The front-end loader will dispose of this material in the dump truck as needed.

When a dump truck has been filled, it will be carefully inspected to remove any additional material accidentally deposited on the outside of the truck box. Any soil removed from the truck will be added to the dump truck. The dump truck will be driven out of the contaminated zone over to building 783, where a tarpaulin cover will be attached to prevent loss of material during transit. Officials at the CFA Landfill Complex will be notified of a pending shipment; completed documentation will accompany the shipment. When the dump truck returns to ANL-W, the truck will be used to remove additional soil from the Industrial Waste Lift Station Discharge Ditch. When all soil has been shipped or prior to the dump truck being used for other non-CERCLA jobs, the dump truck must be washed at the cooling tower decontamination wash pad.

The cooling tower decontamination wash pad consists of a concrete bermed area that is sloped to a centralized drain. A high pressure washer will be used, along with shovels and brooms, to remove all the ditch soil from the truck. Large debris and/or material that is firmly attached to the truck can be removed using a shovel or a scrub brush. After washing the dump truck, it will be moved off the washpad and moved to building 783. The laborers will wash the scrub brushes, shovels, brooms, and other equipment used in the Industrial Waste Lift Station Discharge Ditch using the high-pressure washer. These tools will be air dried and returned to the tool crib. Laborers will also use the high pressure washer to clean the wash pad of all soil residue. The decontamination procedure is included in the ANL-W Environmental Procedure Manual and referenced in Appendix C (Quality Assurance Project Plan). A sample of the wash-pad water will be collected from the storage tank and analyzed.

When analysis results for the decontamination water are received, a determination as to final disposition will be made. If the decontamination water contains no RCRA wastes, the water will either be pumped into the Industrial Waste Lift Station Discharge Ditch or pumped into the evaporation holding tank next to the wash pad. However, if the decontamination water contains hazardous waster, it will be managed in accordance with the substantive aspects of IDAPA 58.01.05008 (Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities). The wastes would be pumped into 55-gal drums and transferred to an ANL-W cargo container, pending disposal in accordance with task 6.3 of Section 3.1, Shipment of Radioactive and Nonradioactive Items of Equipment, Material, and Hazardous Wastes of the *ANL-W Environment, Safety, and Health Manual.*.

5.7 Confirmation Sampling

Confirmation samples are typically collected after the site has been remediated to show that remediation goals established in the ROD have been attained. However, validation sampling cannot be completed at the Industrial Waste Lift Station Discharge Ditch site after the contaminated soil has been removed. The contaminated zone in the Industrial Waste Lift Station Discharge Ditch has been defined as the soil in the ditch to the top of the basalt. The soil on top of the basalt will be removed, leaving only small volumes of soil that are in cracks and fissures of the basalt remaining. The small volumes of soil that remain can't be sampled and used as confirmation samples because the soil structure and concentrations are different from the surface loess. Thus, completely removing the soil in the Industrial Waste Lift Station Discharge Ditch and documenting the removal with photographs satisfies the confirmation sampling requirement.

5.8 Regrading

After the soil has been removed to basalt and documented, clean backfill material can be added to Industrial Waste Lift Station Discharge Ditch. This clean backfill material will be trucked to ANL-W from the borrow pit located 2 miles Northwest of ANL-W. The backfill material will be applied in approximately 4 in. deep lifts, and compacted using the tires and weight of the front-end loader and gas-powered hand tampers around the culverts. Soil application will continue until the ditch-bottom grade is at the % grade line running between the culverts. ANL-W will potentially use a scraper blade on the bottom and side-slopes of the ditch to its original shape.

5.9 Revegetation

Revegetation of this ditch will not be conducted. This ditch lies within the ANL-W fenced area and will be sprayed semiannually with a herbicide and a soil sterilizer to prevent plant growth. This ditch will continue to carry both industrial waste water and storm water runoff and will continue to be used for these purposes.

6 ANL-01 INDUSTRIAL WASTE POND

This section discusses information specific to the Industrial Waste Pond and the work that will be performed during remediation. The necessary work for excavation and disposal of the Industrial Waste Pond soils has been subdivided into major tasks. Activities that are common to all sites being remediated at ANL-W (such as the Health and Safety Plan and the Quality Assurance Project Plan) can be found in the appendices.

6.1 History of Site

The location of the Industrial Waste Pond is shown in Figure 1-3. The Industrial Waste Pond is an unlined, approximately 1.2-ha (3-acre) evaporative seepage pond fed by the Interceptor Canal and site drainage ditches. The pond was excavated in 1959, obtained a maximum water depth of about 4 m (13 ft) in 1988, and is still in use today. The Industrial Waste Pond was originally included with the Main Cooling Tower Blowdown Ditch (ANL-01A) as a Land Disposal Unit under the RCRA COCA on the basis of potentially-corrosive liquid wastes discharged from the cooling tower effluent. However, ANL-W conducted a field demonstration with the EPA and State of Idaho representatives in attendance in July 1988 that showed that any potentially corrosive wastes discharged to the Industrial Waste Pond were naturally neutralized in the Main Cooling Tower Blowdown Ditch before reaching the Industrial Waste Pond. On that basis, EPA removed the Industrial Waste Pond as a Land Disposal Unit and redesignated it as a Solid Waste Management Unit.

In 1998 when the WAG 9 ROD was signed, the Industrial Waste Pond was being used for storm water disposal as well as future releases of cooling water discharges from the SPF. SPF cooling water discharges averaged 100 gpm from the spring of 1998 and lasted until summer of 2002. After the completion of the SPF project the water levels in the Industrial Waste Pond have been steadily decreasing. In the Summer of 2003, ANL-W tracked the water levels in the Industrial Waste Pond to ensure that the sediments in the southern portion which posed the human and ecological risks remained underwater. Since this area also coincides with the deepest area of the Pond, the exposure pathway of contaminants to humans or ecological receptors was not viable. In the Spring of 2004, ANL-W met with representatives of the State of Idaho to discuss the status of the Land Application Permit and the upcoming field work for removal of the contaminants. An official letter of intent was submitted to the State of Idaho in March that identified that the overflow ditch leading to the North away from the Industrial Waste Pond would be used to reroute the water from entering the Industrial Waste Pond. In April, ANL-W started procuring equipment for installation of a temporary lift station to reroute the discharge waters around the Industrial Waste Pond and to the outlet area to the North. This by-pass lift station was installed and tested in May and water was rerouting during the middle of May. After installation of the by-pass lift station, ANL-W installed temporary trash pumps to pump the remaining Industrial Waste Pond waters into the North outlet to allow for ICDF sample collection and to allow for drying of the soils prior to ICDF acceptance.

6.2 Contaminants

Appendix A of *OU 9-04 Comprehensive RI/FS* shows the sampling location plan map and the statistics for COC (by pathway) for all samples collected from the Industrial Waste Pond. Soil and sediment samples were collected from the Industrial Waste Pond as part of four different investigations occurring from 1986 to 1994. Cesium-137 poses unacceptable risks for humans while, four inorganic contaminants (trivalent chromium, mercury, selenium, and zinc) were retained because they pose unacceptable risks to ecological receptors. Cesium-137 and the four inorganics are present in the southern and eastern part of the Industrial Waste Pond with concentrations typically greatest for surface samples near the inlet pipe. Samples were screened against the 95% UCL concentrations for grab samples at the INEEL and will be referred to as 95% UCL background. The highest number of metals above the 95% UCL background concentration were collected from location #101 with 11 metals exceeding background; location # 97 was next with 10 metals exceeding the 95% UCL background concentration. The maximum cesium-137 concentration was 57.91 pCi/g, while the 95% UCL concentration was 29.2 pCi/g. For the trivalent chromium, mercury, selenium, and zinc, the maximum concentrations were 11,400, 6.8, 37.9, and 5,850 mg/kg and the UCL values were 10,300, 2.62, 8.41, and 5,012 mg/kg, respectively. The horizontal extent of contamination is the dimensions of both the southern and eastern parts of the Industrial Waste Pond (200 ft wide and 250 ft long); while the vertical extent of contamination is in the upper 0.5 ft of sediments in the Industrial Waste Pond. The resultant soil volume to be excavated is estimated to be 926 cubic yard but could be up to 23,000 cubic yards if the whole pond has to be remediated to the four foot depth.

6.3 Remediation Goals

The established remediation goal for the cesium-137 is 23.3 pCi/g based on a current activity level (i.e., the level to which the activity will decay to acceptable levels after 100 years). Because the cesium-137 will remain at activity levels that will limit its land use, the Industrial Waste Pond will require Institutional Controls and follow the O&M Plan as shown in Appendix B. The four inorganics that pose the unacceptable ecological risks have remediation goals established in the ROD as being 10 times the INEEL background concentrations. Thus, the chromium, mercury, selenium, and zinc remediation goal concentrations are 500, 0.74, 3.4, and 2,200 mg/kg, respectively.

6.4 Receptors of Concern

The cesium-137 poses the unacceptable risk to humans in the occupational and residential scenarios. The four incorganics; chromium, mercury, selenium, and zinc pose the unacceptable ecological risks to functional group; plants, M222, M222, and AV232, respectively. The current concentrations found in the Industrial Waste Pond for chromium, mercury, selenium, and zinc pose a 200, 30, 20, and 20 fold increase, respectively, in the Hazard Quotient for the Functional Groups as compared to background concentrations. The supporting information is shown in Table 6-6 of the *WAG 9-04 Comprehensive RI/FS*.

6.5 Preexcavation Activities

Preexcavation activities involve creating a paper-trail documentation record of analytical results of past sampling. Previous sampling results will be copied from *WAG 9-04 Comprehensive RI/FS* and attached as supplemental information to the required INEEL managing contractor's documentation packages. Prior to approval to ship the soils to the ICDF, the ICDF representatives must evaluate the analytical results of past sampling and determine contaminants that will require additional confirmatory sampling. ANL-W has entered the Industrial Waste Pond data into the IWITS data base and determined the worst case estimate of contaminated soil that could be removed. For this, ANL-W used the total wetted surface area at the ponds maximum depth (3.5 acres) and estimated a depth of 4 feet across that surface area for a total worst case volume of 22,587 cubic yards. Representatives watching out for the ICDF have prepared a sampling plan (PLN-1659). that will be used to preapprove up to 22,587 cubic yards of material for disposal in the ICDF. Once these samples are collected, the ICDF representatives will approve the soils for disposal in the ICDF.

ANL-W has contracted with BBWI who is managing the INEEL site to use the Subcontractor (Stoller) who is currently completing the excavation and disposal of soils from other INEEL WAGS. Personnel supporting the contract with Stoller such as radiological control technicians, packaging and transportation group, industrial hygiene, safety, and contractual support will also perform these functions for the work to be performed at ANL-W. In essence, this piggy back effect will help decrease the costs for all WAGs based on the increase in soil volume.

The Subcontractor will complete necessary ANL-W specific training that will include General Employee Training, Radiological Training, pre-job safety training, and have completed whole body count, submital of dose records and yearly dose information prior to starting work at ANL-W. The Subcontractor plans on completing this training the same day that they will be mobilizing the equipment and placing it in a staging area at ANL-W. The staging area is located on the West side of the Industrial Waste Pond in an area that has been disturbed in 1986 and contains little vegetation. The Subcontractor will after conducting prejob safety meeting, sign the appropriate forms and then be qualified to complete the work activities as identified in the contract with ANL-W. One of the first activities to be completed by the contractor is to install the entrance approach off the main road and create the staging area. The staging are will contain an area for conducting radiological surveys as well as an elevated platform in which the installation of the liners and the heat sealing will be performed. The Subcontractor will also provide portable lavatory and cleanup station for workers leaving who have completed work in the Industrial Waste Pond. An area of 55 gallon drums will be staged and marked for use as needed for the collection of PPE, residual soils removed during decontamination, and collection of disposable items used in the Industrial Waste Pond. These materials will be appropriately disposed after characterization has been completed.

All work completed at ANL-W will follow ANL-W work control which will require surveying of all equipment that will be used by the Subcontractor for radioactivity before and after use. Additionally, ANL-W will provide a full time health physics technician who will complete surveys of personnel and trucks leafing the Industrial Waste Pond.

6.6 Excavation of Soils

The empty roll-off container (or end-dump truck and pup) will be fitted with a liner in the staging area located on the West side of the Industrial Waste Pond. The liner will hang over the edges of the truck box. The truck will be driven to the edge of the Industrial Waste Pond where it will be loaded. During this episode, the trucks used at the ANL-W dig site will be dedicated to that work in order to minimize the potential transportation of contaminants to and from other remediation sites. It is anticipated that the Subcontractor will use typical heavy equipment such as scrappers, graders, and front end loaders in order to complete the soil removal at the Industrial Waste Pond. The Industrial Waste Pond will be subdivided into smaller sites based on depth of soil to be removed in each site. This division will also allow for collection of confirmation samples in a sequential matter and hopefully allow for additional excavation if necessary when the contractor is still at ANL-W. The truck with the liner will be filled with contaminated soil then transported to a station set up for sealing the liner, screening the exterior of the container for contamination, and performing any necessary decontamination of the container. The screening of containers for contamination will be completed and any decontamination of the exterior surfaces of the container would be performed prior to being approved for shipment. Once these tasks have been adequately performed, the truck carrying the soils will be released for transfer of the soils to the ICDF.

6.7 Transportation of Contaminated Soils

The ICDF Subcontractor will be responsible for all activities within the ICDF. This information is being provided to the Subcontractor to further the understanding of the entire process involved in the remediation, transport, and disposal of the contaminated soils.

Transportation of contaminated soils from the remediation sites to the ICDF or the CFA Landfill shall comply with this Work Plan. The appropriate paperwork for transport and disposal of the contaminated soil is provided to the drivers. A roll-off or end dump truck and pup from the staging area at the remediation site will be picked up for transport to the ICDF. Following the specified route, the container will be transported to the ICDF where the truck will be weighed. With the acceptance of the container at the ICDF, the paperwork related to the loaded container is turned over to the ICDF personnel and the container will be off-loaded in the full container staging area at the ICDF. The truck then proceeds to pick up an empty container from the appropriate staging area at the ICDF for the return trip to the remediation site. Once at the remediation site, the truck will be surveyed as necessary and fitted with another disposable liner.

6.8 Disposal of Contaminated Soils

The ICDF Subcontractor will be responsible for all activities within the ICDF. This information is being provided to the Subcontractor to further the understanding of the entire process involved in the remediation, transport, and disposal of the contaminated soils.

The completed paperwork is given to the ICDF responsible person at the pit site when the truck arrives. If used, the tarp is removed from the container, the rear gate opened, and the load (including the liner) dumped into the landfill at a specified location. The rear gate is then closed, the tarp affixed, and the container surveyed for contamination. If external contamination is detected, the container is decontaminated at the ICDF. Once released from the radiological survey and any related decontamination efforts, the container is transported to the empty container staging area at the ICDF for a final inspection. It remains in the empty container staging area until the Subcontractor picks it up for the return trip to the remediation site. The ICDF Subcontractor personnel are responsible for entry of the waste information and placement at ICDF into their approved data base. Additionally, the IWITS data base will also be updated to show the actual volume of soil and change the location from ANL-W to ICDF. Copies of these records will be maintained by ANL-W.

6.9 Excavation Activities

The extent of contamination in Industrial Waste Pond was determined (in the RI/FS) to be located predominantly in the Southern portion in an area 250 ft long, 200 ft wide, and 0.5 ft deep (926 yd^3). The maximum lateral extent of contamination consisted of the wetted area along the sides of the Industrial Waste Pond and had very little lateral movement. The contamination was predominantly located near the inlet to the Industrial Waste Pond and in the two lowest areas of the Industrial Waste Pond. The excavation will be initiated utilizing a combination of heavy equipment and manual labor. A majority of the contaminated soil can be removed using a front-end loader and dump trucks. However, because of the irregular top surface of the basalt, manual labor will be utilized to remove the soil that the heavy equipment cannot remove around culverts and irregular basalt tops.

The first step in the soil excavation in Industrial Waste Pond will be to mark all existing underground utilities (such as fire-hydrant supply lines, water supply lines, sewer lines, buried electrical lines, overhead power lines, cathodic protection lines, and security warning devices) within 50 ft of the contaminated zone. This will be accomplished by using existing site drawings and onsite inspections by key Plant Services personnel and safety engineers. ANL-W will complete the digging/excavation permit in accordance with Section 4.4H of the *ANL-W Environment, Safety, and Health Manual.* Temporary stands will be spaced approximately 50 ft apart to set up a contaminant reduction zone. The temporary stands will have ring hangers approximately three ft off the ground that will be used to string a yellow and black poly rope between the stands. Signs will be attached to the rope warning people that only authorized personnel are allowed in the contaminant reduction zone. The surface of the Industrial Waste Pond will be wetted using a water truck with side discharge to spray up to 20 feet wide path. Multiple passes will be needed cover the entire Industrial Waste Pond and the staging and work areas.

Prior to initiating the remediation effort at the Industrial Waste Pond, a safety meeting will be held for all workers to define the hazards associated with the removal action. The workers will be dressed in Occupational Safety and Health Administration (OSHA) level-D personnel protective equipment (PPE). As a minimum the PPE will consist of leather shoes, leather gloves, safety glasses, hardhats, and coveralls. In addition, there will be no eating, drinking, smoking, or gum chewing in the contaminant reduction zone.

6.10 Confirmation Sampling

Confirmation samples are typically collected after the site has been remediated to show that remediation goals established in the ROD have been attained. The contaminated zone in the Industrial Waste Pond has been defined as the soil in an area approximately 200 by 250 by 0.5 feet depth located in the southern portion near the inlet. The bottom of the Industrial Waste Pond is irregular and the topography varies across the pond with the depth to the underlying basalt varies from less than six inches to approximately 4 feet. Heavy equipment will be used to remove the soil on top of the basalt to the predetermined depth. If the basalt lies less than 0.5 feet below the grade, the heavy equipment will end up leaving small volumes of soil that will remain in cracks and fissures of the basalt surface. The small volumes of soil that remain can't be sampled and used as confirmation samples because the soil structure and concentrations are different from the surface loess. If this happens, another sample location will be selected near the randomly selected location and the log book will be revised to show the change in sample location.

6.11 Regrading

ANL-W is not planning on adding any additional material to the Industrial Waste Pond since it will be reused and the sediments will again be underwater. Since the Industrial Waste Pond is frequently used by desert wildlife, ANL-W currently plans on smoothing out the edges in order to make a smooth transition with no abrupt edges. If for some unforseen reason that placement of soils is needed at the Industrial Waste Pond, clean backfill material can be added from the borrow pit located approximately 2 miles Northwest of ANL-W. The backfill material would be applied in approximately 4 in. deep lifts, and compacted using the tires and weight of the front-end loader and compactor. After completion of the regrading activities, ANL-W will use a scraper blade to return the Industrial Waste Pond to its original shape.

6.12 Revegetation

Revegetation of the Industrial Waste Pond will be completed on those portions that are anticipated to be above the water level. The future activities at ANL-W that continue to discharge industrial waste water have the potential to refill the pond to pre excavation and disposal levels. The vegetative mix that will be used will be the same as that which is currently approved for use at the INEEL and will consist of a mixture of native vegetation. This native mix will be applied late in the fall and will consist of very little preplanting preparations other than discing. It is anticipated that the native mixture will be applied using a drill and tackifier consisting of paper mulch. Population studies of the native plants growing the first year will determine if future overseeding is needed for specific plant species and areas. The goal is that after 10 years the types and densities of the plants will be similar to those found naturally at the INEEL.

7 REMEDIAL DESIGN PROJECT INFORMATION

This section addresses key remedial-action activities that will be performed—field oversight/construction management, project cost estimates, and schedules, inspections, pre-final inspection report, final inspection, Institutional Control Plan, Operations and Maintenance Plan, and five-year reviews.

7.1 Field Oversight/Construction Management

The DOE-CH Remediation Project Manager will be responsible for notifying the EPA and State of Idaho DEQ of project activities and serving as the single interface point for all routine contact between the Agencies. The ANL-W Project Engineer will be responsible for oversight of contractors, Subcontractors, ANL-W employees, field work, project oversight, and excavation and disposal of contaminated soils. An organizational chart and position description are provided in the HASP.

7.2 Project Cost Estimates

Project cost estimate are provided in Tables 7-1 and 7-2. The cost estimate for completing remediation at ANL-W (outlined in the work plan) has changed since the WAG 9 ROD. This change stems from use of the implementation to the contingent remedy of excavation and on-INEEL disposal for these three sites versus the planned phytoremediation. Table 7.1 shows the cost estimate for excavation and disposal at the CFA landfill. Worst cases estimates show that Ditch A soils contain 37 cubic yards and the Industrial Waste Lift Station Discharge Ditch contains 74 for a total of 110 cubic yards. Costs for the removal of the hot spots should be less than this estimate if the real time sampling can identify the hot spots during excavation. Table 7-2 shows the costs for excavation and disposal of Industrial Waste Pond soils using the ICDF and Subcontracted support. The estimated volume of soil to be removed from the Industrial Waste Pond is 926 cubic yards. Costs may be revised during future submissions of this document to reflect the most accurate cost estimates and known contractor quotes.

A comparison of the costs for continuation of phytoremediation against the use of excavation and disposal shows that are within $87,000 of each other which for a project with budget around $1.8 million (from table 7.1 and 7.1) is difference is negligible. To date $1,453,799 was used to complete the four years of phytoremediation. A complete comparison of the costs is included in the 1997 ROD in Appendix M. However, the innovative technology of phytoremediation does not necessarily guarantee success as compared to excavation and disposal.

Table 7-1. Detailed Cost Summary Sheet for Excavation per 100 yd^3 with on-INEEL Disposal at the CFA landfill.

Cost Elements			Costs ($)
WAG 9 Management Costs			
CERCLA RD/RA Oversight	**Subtotal**		**$81,000**
Documentation Package			
Site surveying (GPS)		$	1,500
Confirmation Sampling Plan		$	1,000
Confirmation Sampling Costs		$	1,500
Safe Work Permit		$	3,500
Radiation Work Permit		$	3,500
Excavation Permit		$	3,500
Waste Acceptance Report to LMITCO		$	5,500
	Subtotal		**$20,000**
Construction Costs			
Mobilization and Demobilization		$	2,000
Soil Removal		$	25,000
Soil Transport to INEEL Repository		$	10,000
Tipping Fee/cy		$	2,000
Backfill Site to Grade		$	10,000
Revegetation		$	0
	Subtotal		**$49,000**
Operations and Maintenance Costs			
Postclosure Management		$	0
Monitoring		$	0
WAG 9, Five-year Reviews		$	0
	Subtotal		**$0**
Total in 1999 dollars		**$**	**150,000**
Number of 100 cy units	1.11	**$**	**166,500**
Total in 2004 dollars		**$**	**212,501**

Table 7-2. Detailed Cost Summary Sheet for Excavation per 100 yd^3 with on-INEEL Disposal at the ICDF.

Cost Elements			Costs ($)
WAG 9 Management Costs			
CERCLA RD/RA Oversight	**Subtotal**		**$40,000**
Documentation Package			
Site surveying (GPS)		$	1,500
Confirmation Sampling Plan		$	1,000
Confirmation Sampling Costs		$	1,500
Safe Work Permit		$	3,500
Radiation Work Permit		$	3,500
Excavation Permit		$	3,500
Waste Acceptance Report to LMITCO		$	5,500
	Subtotal		**$20,000**
Construction Costs			
Mobilization and Demobilization		$	2,000
Soil Removal		$	25,000
Soil Transport to INEEL Repository		$	10,000
Tipping Fee/cy		$	0
Backfill Site to Grade		$	0
Revegetation		$	13,888
	Subtotal		**$50,888**
Operations and Maintenance Costs			
Postclosure Management		$	0
Monitoring		$	12,000
WAG 9, Five-year Reviews		$	17,000
	Subtotal		**$29,000**
Total in 1999 dollars/100 cy		**$**	**139,888**
Number of 100 cy units	9.26	**$**	**1,295,363**
Total in 2004 dollars (5% escalation/year)		**$**	**1,582,394**

7.3 Project Schedule

The WAG 9 remedial action schedule is shown in Appendix F. It identifies the overall working schedule for WAG 9 implementation of excavation and disposal of soils from three sites at ANL-W. After confirmation samples from the sites are collected, analyzed, validated, and evaluated, the final report will be written and submitted to the Agencies.

7.4 Inspections

At their discretion, agency project managers or their designees may inspect the site during the process to assess compliance with the remedial design and procedures outlined in the remedial-action work plan. DOE anticipates that, during the excavation and disposal activities, personnel from the EPA or State of Idaho DEQ, whom are not directly associated with WAG 9, will want a tour of the process. These tours can be arranged by contacting the DOE ANL-W Argonne Area Office.

7.5 Pre-final Inspection

The pre-final inspection will be conducted by agency project managers or their designees prior to completing remediation. A checklist documenting the pre-final inspection will be developed and approved by the Agencies appoximately 3 weeks before the inspection. Action for resolution and on anticipated schedule for completion will be noted next to the outstanding items and documented on the pre-final inspection checklist. DOE-AAO will notify the Agencies approxmately 2 weeks prior to the pre-final inspection date.

After the pre-final inspection, the DOE-AAO Remediation Project Manager will be responsible for:

- Inspecting outstanding items after they are completed.
- Recording the date work was completed and inspected.
- Authorizing remedial-action activities to be completed.

7.6 Pre-final Inspection Report

Following the pre-final inspection, pre-final inspection report will be prepared and submitted to the EPA and State of Idaho DEQ as a secondary document. Although DOE-AAO will respond to the comments received from the EPA and State of Idaho DEQ, the pre-final inspection report will not be revised. Instead, comments will be finalized in the context of the remedial action report, a primary document, in accordance with Section 8.4 of the FFA/CO.

The pre-final inspection report will include:

- Names of inspection participants
- Inspection checklist identifying project components that are not in compliance with the drawings or specifications

- Discussion of findings
- Corrective-action plans to correct deficiencies
- Operation and Maintenance Plan update
- Date of final inspection.

All outstanding construction requirements, along with the actions required to resolve those items, will be identified and approved by the Agencies during the pre-final inspection. The pre-final inspection report will then document any unresolved items and the effort required to resolve them.

7.7 Final Inspection

The final inspection will be conducted following demobilization (after all excess materials and nonessential construction equipment have been removed from the site). Some equipment may remain onsite to repair items observed during the final inspection., This final inspection conducted by the Agencies project managers or their designees will confirm the resolution of all outstanding items identified in the pre-final inspection and verify that OU 9-04 remedial action has been completed in accordance with the requirements of the ROD.

7.8 Remedial Action Report

The remedial action report will be prepared following demobilization and restoration of the site, and submitted to the Agencies as a primary document. In accordance to Exhibit 2-3 of the EPA OSWER Directive 9320.2-09 A-P, outlines the contents of an Remedial Action (RA) Report must include. The remedial action report will include the information shown on the next three pages.

SECTION	CONTENTS
I. Introduction	• Include a brief description of the location, size, environmental setting, and operational history of the site. • Describe the operations and waste management practices that contributed to contamination of the site. • Describe the regulatory and enforcement history of the site. • Describe the major findings and results of site investigation activities. • Describe prior removal and remedial activities at the site. • Describe the other OUs designated at the site and introduce the OU for which the RA Report applies.
II. Operable Unit Background	• Summarize requirements specified in the ROD for the OU. Include information on the cleanup goals, institutional controls, monitoring requirements, operation and maintenance requirements, and other parameters applicable to the design, construction, operation, and performance of the RA. • Provide additional information regarding the basis for determining the cleanup goals for the OU, including planned future land use. • Summarize the remedial design, including any significant regulatory or technical considerations or events occurring during the preparation of the RD. • Identify and briefly discuss any ROD amendments, explanation of significant differences, or technical impracticability waivers.
III. Construction Activities	• Provide a step-by-step summary description of the activities undertaken to construct and implement the RA (e.g., mobilization and site preparatory work; construction of the treatment system; associated site work, such as fencing and surface water collection and control; system operation and monitoring; and sampling activities). • If a treatment remedy, refer reader to Appendix A for characteristics, site conditions, and operating parameters for the system.
IV. Chronology of Events	• Provide a tabular summary that lists the major events for the OU, and associated dates of those events, starting with ROD signature. • Include significant milestones and dates, such as, remedial design submittal and approval; ROD amendments; mobilization and construction of the remedy; significant operational events such as treatment system / application start-up, monitoring and sampling events, system modifications, operational down time, variances or non-compliance situations, and final shut-down or cessation of operations; final sampling and confirmation-of-performance results; required inspections; demobilization; and completion or startup of post-construction operation & maintenance activities. • If an Interim RA Report, indicate when cleanup goals are projected to be achieved for the ground or surface water restoration.

SECTION		CONTENTS
V.	Performance Standards and Construction Quality Control	• Describe the overall performance of the technology in terms of comparison to cleanup goals. • For treatment remedies, identify the quantity of material treated, the strategy used for collecting and analyzing samples, and the overall results from the sampling and analysis effort. • Provide an explanation of the approved construction quality assurance and construction quality control requirements or cite the appropriate reference for this material. Explain any substantial problems or deviations. • Provide an assessment of the performance data quality, including the overall quality of the analytical data, with a brief discussion of quality assurance and quality control (QA/QC) procedures followed, use of a quality assurance project plan (QAPP), comparison of analytical data with data quality objectives (DQOs). • For PRP-funded projects, discuss EPA's oversight activities and results with regard to analytical data quality.
VI.	Final Inspection and Certifications	• Report the results of the various RA contract inspections, and identify noted deficiencies. • Briefly describe adherence to health and safety requirements while implementing the RA. Explain any substantial problems or deviations. • If implemented, summarize details of the institutional controls (e.g., the type of institutional control, who will maintain the control, who will enforce the control). • For RP-lead, describe results of pre-certification inspection. • If applicable, certify that the remedy is operational and functional, along with the date this was achieved.
VII.	Operation & Maintenance Activities	• Describe the general activities for post-construction operation and maintenance activities, such as monitoring, site maintenance, and closure activities. • Identify potential problems or concerns with such activities. • If an Interim RA Report, describe the future ground water or surface water restoration activities to meet cleanup goals.
VIII.	Summary of Project Costs	• Provide the actual final costs and applicable year for the project. This is required for Fund-lead projects and should be provided whenever possible for PRP-lead projects. If actual costs are not available, provide estimated costs. • Provide the costs previously estimated in the ROD for the selected remedy, including, as applicable, RA capital costs, RA operating costs, post-RA annual O&M costs, and number of years of O&M. Adjust the estimates to the same dollar basis year as the actual project costs, and provide the index used. • Compare actual RA costs to the adjusted ROD estimates. If outside range of -30 to +50 percent, explain the reasons for differences. • If the project is PRP-funded, include a summary of EPA oversight costs for RD and RA. • For treatment remedies, calculate unit costs based on the sum of the actual RA capital and RA operating costs divided by the quantity of material treated. • Refer reader to Appendix A for a detailed breakdown of RA and O&M costs.

SECTION	CONTENTS
IX. Observations and Lessons Learned	• Provide site-specific observations and lessons learned from the project, highlighting successes and problems encountered and how resolved.
X. Operable Unit Contact Information	• Provide contact information (names, addresses, phone numbers, and contract / reference data) for the major design and remediation contractors, EPA oversight contractors, and the respective RPM and project managers for EPA, the State, and the PRPs, as applicable.
Appendix A Cost and Performance Summary	• The specific parameters presented in Appendix A are in accordance with the "Guide to Documenting and Managing Cost and Performance Information for Remediation Projects," EPA 542-B-98-007. Regions are encouraged to use the recommended procedures outlined in this Guide for documenting cost and performance information as part of the RA Report. • Identify the matrix characteristics and site conditions that most affected the cost and performance, the corresponding values measured for each characteristic or condition, and the procedures used for measuring those characteristics or conditions. These items include the soil type and particle size distribution, environmental setting, media properties, and quantity of materials treated. • Identify the operating parameters specified by the remediation contractor that most affected the cost and performance, the corresponding values measured for each parameter, and the procedures used for measuring those parameters. These items include system throughput, pumping rate, flow rate, mixing rates, residence time, operating pressure and temperature, moisture content, and pH. • Provide a detailed breakout of the actual RA capital costs, RA operating costs (costs to operate and maintain the treatment process), and estimated
Other Appendices	• Provide supplemental information in appendices to the RA Report. These could include a map of the site and operable unit, a schematic of the treatment system, supplemental performance information, and a list of references.

7.9 Operations and Maintanence Report

The O&M report will be used to formally document that the ROD remediation goals have been attained. The O&M report will also document what post-remedial actions are required. These post-remedial actions involve updating the O&M plan to incorporate any changes that have taken place since remedial action was completed, and complying with the ANL-W Institutional Control Plan and CERCLA five-year reviews. Details of the Institutional Control Plan and five-year reviews are discussed in the following two sections.

7.10 Institutional Control Plan

The Institutional Control Plan (ICP) for WAG 9 OU 9-04 at the INEEL has been written as a stand alone document. The ICP is included as Appendix H to this OU 9-04 Remedial Design.

7.11 Five-Year Reviews

In accordance with the NCP for sites where contamination is left in place at levels that are above risk-based levels for unlimited use, a review of the selected remedy will be conducted no less than every five-years until it is determined by the Agencies to be unnecessary. The five-year review will evaluate the remedy to determine if it is being protective of human health and the environment. For OU 9-04, three sites will need to be evaluated because ANL-W is only remediating the radionuclide concentrations of cesium-137 to levels that will decay to background levels after 100 years. DOE has determined that the most likely exposure scenario for ANL-W is for a residential receptor 100 years in the future (2097). Thus, the remediation goals were back-calculated using the concentrations of cesium-137 that would be acceptable for unrestricted use 100 years in the future. All other OU 9-04 sites have remediation goals for ecological receptors that once met will allow the land to be released for unrestricted use.

The three sites (Industrial Waste Pond, Interceptor Canal-Canal, and Interceptor Canal-Mound) that have cesium-137 remediation goals at levels that are above those allowed for unrestricted use will complete the following checklist and submit it to the Agencies for the first five-year review. After the checklist is reviewed, the Agencies will determine if the site warrants the next five-year review. This process will continue until the Agencies determine otherwise or the 100 year institutional control period is completed (2097). Table 7-3 shows the five-year checklist that DOE will submit to the Agencies for each of the three sites with contaminant levels that exceed those of an unlimited release.

Table 7-3 Five Year Review Checklist.

Task	Yes	No
Has an on site inspection been completed for all three sites?		
Are human residents living within 50 meters of the Industrial Waste Pond site?		
Are human residents living within 50 meters of the Interceptor Canal-Canal site?		
Are human residents living within 50 meters of the Interceptor Canal-Mound site?		
Are warning signs in place and still readable at the Industrial Waste Pond site?		
Are warning signs in place and still readable at the Interceptor Canal-Canal site?		
Are warning signs in place and still readable at the Interceptor Canal-Mound site?		
Are land-use restrictions for the Industrial Waste Pond recorded and available for inspection at the Bingham county courthouse?		
Are land-use restrictions for the Interceptor Canal-Canal recorded and available for inspection at the Bingham county courthouse?		
Are the land use restrictions for the Interceptor Canal-Mound recorded and available for inspection at the Bingham county courthouse?		
Were any air, soil, or groundwater samples collected? If yes, attach summary of results.		
Are there any construction or mining activities that threaten to encroach on or undermine any of the these three sites?		
Are the Institutional Controls (warning signs and land-use restrictions) at the Industrial Waste Pond site still protective?		
Are the Institutional Controls (warning signs and land-use restrictions) at the Interceptor Canal-Canal site still protective?		
Are the Institutional Controls (warning signs and land-use restrictions) at the Interceptor Canal-Mound site still protective?		
Are current photos of each site attached to this checklist?		
Is the current responsible federal agency contact person and their address identified and attached to this check list?		
Is a review needed prior to the next five year review?		
Schedule date for submittal of next five-year review		

Signature of engineer responsible for completing this review: ______________________	Date: __________

8 INCORPORATION OF ARARs

Under CERCLA Section 121, response actions conducted entirely onsite are exempt from obtaining federal, state, or local permits. However, these actions must comply with the substantive aspects of the applicable or relevant and appropriate requirements (ARARs) specified for the site. Table 8-1 summarizes how the substantive requirements of the ARARs and the to-be-considered (TBC) requirements for the three ANL-W sites that will undergo excavation and disposal (Industrial Waste Pond, Ditch A, and the Industrial Waste Lift Station Discharge Ditch) have been addressed by the remedial design or will be addressed during the remedial action. Additional discussion of the ARARs for the remedial actions is found in Section 9 of the WAG 9 ROD.

Two of the identified ARARs that are identified require modeling prior to remedy implementation. These are air-emission calculations and radionuclide monitoring as identified in 40 CFR 61.92 and IDAPA 58.01.01.585 and .586. Notice that since 1998 when the ROD was completed, the State of Idaho has renumbered the IDAPA's and what was listed as IDAPA 16.01.01.589 is now IDAPA 58.01.01.589. This change to update to the new IDAPA numbering format has been made to the ARAR tables. The emission calculations are needed so they can be compared to the regulated concentrations prior to remedy implementation. If a remedy exceeds the regulated values, engineering controls can be implemented to reduce emissions to acceptable levels. Section 8.1 describes the details of the air-emission calculations that have been performed prior to implementation of the excavation and disposal remedy.

8.1 Air Emissions Calculations

Air emission calculations are needed to satisfy 40 CFR 61.92 for Emissions of Radionuclides Other than Radon from DOE facilities prior to implementation of the remedy. In addition, fugitive dust emissions of carcinogenic and noncarcinogenic contaminants are needed prior to initiating the remedy to satisfy IDAPA 58.01.01.585 and 586. The following two sections discuss (in detail) the assumptions used in modeling and the results of the air-emissions modeling.

8.1.1 Radionuclide Modeling

CAPP 88PC, an EPA-approved computer code, was used to calculate the possible radionuclide emissions to the nearest off-site receptor expousre level. This calculated exposure level was then compared to 40 CFR 61.92 for Emissions of Radionuclides Other than Radon limit of 10 mrem/year.

The Industrial Waste Pond site is the only site currently undergoing cleanup for radionuclides and requires CAP88PC modeling. As shown in the CAPP88PC modeling runs for the Industrial Waste Pond (shown in Appendix E), the exposure for cesium-137 and it's daughter barium 137M is only xxx7.38 E-05 mrem/year, well below the 10 mrem/year limit. (Appendix E contains the report on the CAP 88PC modeling.)

Table 8-1. Evaluation of ARARs and TBC compliance for on-INEEL disposal of contaminated soils.

ARAR Statute	Citation	Requirement(s)	Relevancy	Compliance Strategy
Action				
Idaho Fugitive Dust Emissions	IDAPA 58.01.01.650	To control dust during excavation operations.	Applicable	Application of water and if needed chemical dust suppressants to land disturbed by excavation/trucking operations will limit the release of dust. The sites being excavated are wetted by surface water runoff and industrial water discharges.
General Requirements for Shippers	49 CFR 173	DOE will have to comply with the requirements for packaging and transporting of radioactive and hazardous material to on-INEEL disposal site.	Applicable	These packaging and transportation regulations will be met by placing the waste in appropriate shipping containers and applying the appropriate placards.
Chemical				
NESHAPS-Radionuclides other than Radon-222 and -220 at DOE facilities-Emission Standard	40 CFR 61.92	Limits the exposure of radioactive contaminant release to 10 mrem/year for the off-site receptors.	Applicable	CAPP 88PC modeling is not required for the soils in Ditch B and the Main Cooling Tower Blowdown Ditch since the radionuclides are at levels below those of INEEL background.
Rules for the Control of Air Pollution in Idaho	IDAPA 58.01.01.585 and 586	Idaho rules governing the release and verification of carcinogenic and noncarcinogenic contaminants into the air.	Applicable	Calculations of the contaminants that would be released into the air from the remediation effort have been calculated and compared to the screening emission levels. As shown in Appendix E, none of the contaminant emission limits are exceeded.

Table 8-1 (Continued).

ARAR Statute	Citation	Requirement(s)	Relevancy	Compliance Strategy
Location				
Archeological and Historic Preservation Act	16 USC 470	This will be applicable if unexpected cultural artifacts are uncovered during excavation operations.	Relevant and Appropriate	The areas at WAG 9 that will be remediated are less than 50 years old, man made ditches and ponds, and have not been identified as having cultural significance. If cultural artifacts are encountered, DOE will stop work and conduct a detailed survey of the area.
To Be Considered				
Environmental Protection, Safety, and Health Protection Standards	DOE Order 440.1	DOE Orders for protecting workers.	To Be Considered	Worker compliance with Standard Operating Procedures specified in the DOE Order-based Environment, Safety, and Health Manual ensures safe remediation activities.
Radioactive Waste Management	DOE Order 5820.2A and 435.1 in FY 2000	DOE Orders provide guidance on disposal of low-level radioactive waste.	To Be Considered	Worker compliance with Standard Operating Procedures specified in the DOE Order-based Environment, Safety, and Health Manual and the Waste Handling Manual ensures safe packaging and disposal of low-level radioactive waste.
Radiation Protection of the Public and Environment	DOE Order 231.1	DOE Orders that provide guidance on radiological environmental protection and guidelines on cleanup of residual radioactive material prior to release of the property.	To Be Considered	Worker compliance with Standard Operating Procedures specified in the DOE Order-based Environment, Safety, and Health Manual ensures protection of the public and environment from radiological hazards.

8.1.2 Fugitive Dust Emissions

Emissions of fugitive dust released during the remediation activities at ANL-W must be calculated and compared to the exposure limits specified in IDAPA Section 58.01.01.585 and .586. Section 585 identifies the exposure limits for non carcinogenic contaminants while Section 586 identifies the exposure limits for carcinogenic releases. The fugitive dust analysis consisted of dust emissions from heavy equipment operating in a contaminated site and the emissions from material excavation activities (i.e., dumping). The total emission was calculated by summing the individual emissions from the two sources for each particle size and then adding the five particle size emissions together. Appendix E contains the fugitive dust emission calculations for each site. All of the contaminants at the ANL-W sites are noncarcinogenic and the releases are orders of magnitude below the screening emission levels identified in 58.01.01.585.